**LESSON PLAN**

**Course Code& Course Name:**S 372 Robotics**SEM:** VIII (B Section)
**Programme:** B.Tech**Department:**MECHANICAL ENGG

| S No. | Tentative Date | Topics to be covered | Actual Date | Num. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I** | | | | | |
| 1. | 28-12-2016 | Basic concepts –Robot Anatomy | | 1 | DM1,DM6 |
| 2. | 29-12-2016 | Components of Robots | | 1 | DM1, DM6 |
| 3. | 30-12-2016 | Robot motions – Number of D.O.F | | 1 | DM1, DM6 |
| 4. | 02-01-2017 | Work volume | | 1 | DM1, DM6 |
| 5. | 03-01-2017 | Robot drive systems | | 1 | DM1, DM6 |
| 6. | 04-01-2017 | Classification of robots by control method | | 1 | DM1,DM6 |
| 7. | 05-01-2017 | Specifications of robots | | 1 | DM1, DM6 |
| 8. | 06-01-2017 | Tutorial-1 | | 1 | DM2 |
| 9. | 09-01-2017 | Introduction – Types of end effectors | | 1 | DM1,DM6 |
| 10. | 10-01-2017 | Mechanical grippers | | 1 | DM1,DM6 |
| 11. | 11-01-2017 | Vacuum cups, magnetic grippers, | | 1 | DM1,DM6 |
| 12. | 12-01-2017 | Adhesive gripers and other type of grippers | | 1 | DM1,DM6 |
| 13. | 17-01-2017 | Robot / End effectors interface – Considerations in gripper selection and design | | 1 | DM1,DM6 |
| 14. | 18-01-2017 | Tutorial-2 | | 1 | DM2 |
| 15. | 19-01-2017 | Quiz/Assignment-1 | | 1 | DM3,DM4 |
| | | **UNIT-II** | | | |
| 16. | 20-01-2017 | Introduction to linear algebra | | 1 | DM1,DM6 |
| 17. | 23-01-2017 | Coordinate Frames | | 1 | DM1, DM6 |
| 18. | 24-01-2017 | Coordinate Frames | | 1 | DM1 |
| 19. | 25-01-2017 | Description of Objects in space | | 1 | DM1, DM6 |
| 20. | 27-01-2017 | Transformation of vectors | | 1 | DM1 |
| 21. | 30-01-2017 | Inverting a Homogeneous Transform | | 1 | DM1,DM6 |
| 22. | 31-01-2017 | Fundamental Rotation Matrices | | 1 | DM3 |
| 23. | 01-02-2017 | Fundamental Rotation Matrices-Fixed angle representation | | 1 | DM1,DM6 |
| 24. | 02-02-2017 | Fundamental Rotation Matrices-Euler Angle Representation | | 1 | DM1, DM6 |
| 25. | 03-02-2017 | Tutorial-4 | | 1 | DM2 |
| 26. | 06-02-2017 | D-H representation | | 1 | DM1, DM6 |
| 27. | 07-02-2017 | D-H Representation-Kinematic Modeling | | 1 | DM1,DM6 |
| 28. | 08-02-2017 | Forward Kinematics | | 1 | DM1, DM6 |
| 29. | 09-02-2017 | Forward Kinematics | | 1 | DM1 |
| 30. | 10-02-2017 | Tutorial-4 | | 1 | DM2 |
| 31. | 13-02-2017 | Quiz/Assignment-2 | | 1 | DM3,DM4 |
| | | **UNIT-III** | | | |
| 32. | 14-02-2017 | Introduction and basics of differential motion. | | 1 | DM1, DM6 |
| 33. | 15-02-2017 | Relation between transformation matrix and angular velocity | | 1 | DM1 |

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|---|---|---|---|---|---|
| 34. | 16-02-2017 | Manipulator Jacobian | | 1 | DM1 |
| 35. | 17-02-2017 | Problems on Jacobian matrix | | 1 | DM1 |
| 36. | 28-02-2017 | Problems on Jacobian matrix | | 1 | DM1 |
| 37. | 01-03-2017 | Problems on Jacobian matrix | | 1 | DM1 |
| 38. | 02-03-2017 | Tutorial-5 | | 1 | DM2 |
| 39. | 03-03-2017 | Introduction and Lagrangian Mechanics | | 1 | DM3,DM4 |
| 40. | 06-03-2017 | Lagrangian Mechanics | | 1 | DM1, DM6 |
| 41. | 07-03-2017 | Lagrange –Euler formulation | | 1 | DM1, DM6 |
| 42. | 08-03-2017 | Lagrange –Euler formulation | | 1 | DM1 |
| 43. | 09-03-2017 | Problems on L-E formulation | | 1 | DM1, DM6 |
| 44. | 10-03-2017 | Problems on L-E formulation | | 1 | DM1 |
| 45. | 13-03-2017 | Tutorial-6 | | 1 | DM2 |
| 46. | 14-03-2017 | Assignment/Quiz-3 | | 1 | DM3,DM4 |
| 47. | 15-03-2017 | **Beyond the syllabus**--Biologically inspired Robot Mechanisms | | 1 | DM1, DM6 |
| | | **UNIT-IV** | | | |
| 48. | 16-03-2017 | Introduction- Considerations in trajectory | | 1 | DM1,DM6 |
| 49. | 17-03-2017 | Joint Interpolated trajectory planning | | 1 | DM1, DM6 |
| 50. | 20-03-2017 | Joint Interpolated trajectory planning | | 1 | DM1 |
| 51. | 21-03-2017 | Joint Interpolated trajectory planning | | 1 | DM1 |
| 52. | 22-03-2017 | Cartesian path trajectory | | 1 | DM1, DM6 |
| 53. | 23-03-2017 | Cartesian path trajectory | | 1 | DM1, DM6 |
| 54. | 24-03-2017 | Tutorial-7 | | 1 | DM2 |
| 55. | 27-03-2017 | Methods of robot programming | | 1 | DM1, DM6 |
| 56. | 29-03-2017 | Lead through method | | 1 | DM1, DM6 |
| 57. | 30-03-2017 | Lead through method | | 1 | DM1,DM6 |
| 58. | 31-03-2017 | Textual robot language Generations of programming languages | | 1 | DM1, DM6 |
| 59. | 03-04-2017 | Robot language structure | | 1 | DM1, DM6 |
| 60. | 04-04-2017 | Motion commands- End effector and sensor commands | | 1 | DM1, DM6 |
| 61. | 05-04-2017 | VAL II programming language | | 1 | DM5 |
| 62. | 06-04-2017 | Tutorial-8 | | 1 | DM2 |
| 63. | 07-04-2017 | Quiz/Assignment-4 | | 1 | DM3,DM4 |
| 64. | 10-04-2017 | **Beyond the syllabus**--Robot Vision –How a robot can see like a human | | | DM1, DM6 |
| | | **UNIT-V** | | | |
| 65. | 11-04-2017 | Pneumatic & Hydraulic actuators | | 1 | DM1, DM6 |
| 66. | 12-04-2017 | Servo motors | | 1 | DM1, DM6 |
| 67. | 13-04-2017 | Stepper motors | | 1 | DM1, DM6 |
| 68. | 17-04-2017 | Position sensors: Potentiometers | | 1 | DM1, DM6 |
| 69. | 18-04-2017 | Resolver | | 1 | DM1, DM6 |
| 70. | 19-04-2017 | Encoders | | 1 | DM1, DM6 |
| 71. | 20-04-2017 | Velocity sensors | | 1 | DM1, DM6 |

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| 72. | 21-04-2017 | Tutorial-9 | | 1 | DM2 |
| 73. | 24-04-2017 | Material transfer and machine loading/ unloading applications | | 1 | DM1, DM6 |
| 74. | 25-04-2017 | Processing operations | | 1 | DM1, DM6 |
| 75. | 26-04-2017 | Assembly and inspection – Future applications. | | 1 | DM1, DM6 |
| 76. | 27-04-2017 | Tutorial-10 | | 1 | DM2 |
| 77. | 28-04-2017 | Quiz/Assignment-5 | | 1 | DM3,DM4 |
| | | Beyond the syllabus topics are scheduled at the end of units 3&4<br>Topic 1: Biologically inspired Robot Mechanisms<br>Topic 2: Robot Vision –How a Robot can see like human eye | | | |
| **Total number of classes required to complete the syllabus** | | | | | **75** |
| **Total number of classes available as per Schedule** | | | | | **77** |
| | | | | | |

**NOTE: DELIVERY METHODS**: **DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial, **DM3:** Lecture with a quiz, **DM4**: Assignment/Test, **DM5**: Demonstration (laboratory, field visit), **DM6:** Presentations/PPT

At the End of the course, students attained the **Course Outcomes:CO1,CO2,CO3,CO4and CO5**

**CO1**:Apply robot fundamentals in designing various types of end effectors.
**CO2**:Design the end effectors required for different applications.
**CO3:**Formulate D-H matrices for forward kinematics problems & Develop dynamic equations for robot dynamic problems.
**CO4**:Determine the robot trajectory to robotic motion & Basics of Robot Language.
**CO5**: Select the sensors depending upon robotic application & its uses in various areas.

| **Signature** | | | | | |
|---|---|---|---|---|---|
| | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Program Coordinator** | **HOD** |
| | V.Venkatesu | K.V.Viswanadh | B Sudheer Kumar | Dr. S. Pichi Reddy | Dr. K. AppaRao |

**LESSON PLAN**

**Course Code& Course Name:**S 372 Robotics**SEM:** VIII (A Section)
**Programme:** B.Tech**Department:**MECHANICAL ENGG

| S No. | Tentative Date | Topics to be covered | Actual Date | Num. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I** | | | | | |
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| 2. | 29-12-2016 | Components of Robots | | 1 | DM1, DM6 |
| 3. | 30-12-2016 | Robot motions – Number of D.O.F | | 1 | DM1, DM6 |
| 4. | 02-01-2017 | Work volume | | 1 | DM1, DM6 |
| 5. | 03-01-2017 | Robot drive systems | | 1 | DM1, DM6 |
| 6. | 04-01-2017 | Classification of robots by control method | | 1 | DM1,DM6 |
| 7. | 05-01-2017 | Specifications of robots | | 1 | DM1, DM6 |
| 8. | 06-01-2017 | Tutorial-1 | | 1 | DM2 |
| 9. | 09-01-2017 | Introduction – Types of end effectors | | 1 | DM1,DM6 |
| 10. | 10-01-2017 | Mechanical grippers | | 1 | DM1,DM6 |
| 11. | 11-01-2017 | Vacuum cups, magnetic grippers, | | 1 | DM1,DM6 |
| 12. | 12-01-2017 | Adhesive gripers and other type of grippers | | 1 | DM1,DM6 |
| 13. | 17-01-2017 | Robot / End effectors interface – Considerations in gripper selection and design | | 1 | DM1,DM6 |
| 14. | 18-01-2017 | Tutorial-2 | | 1 | DM2 |
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| | | **UNIT-II** | | | |
| 16. | 20-01-2017 | Introduction to linear algebra | | 1 | DM1,DM6 |
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| 18. | 24-01-2017 | Coordinate Frames | | 1 | DM1 |
| 19. | 25-01-2017 | Description of Objects in space | | 1 | DM1, DM6 |
| 20. | 27-01-2017 | Transformation of vectors | | 1 | DM1 |
| 21. | 30-01-2017 | Inverting a Homogeneous Transform | | 1 | DM1,DM6 |
| 22. | 31-01-2017 | Fundamental Rotation Matrices | | 1 | DM3 |
| 23. | 01-02-2017 | Fundamental Rotation Matrices-Fixed angle representation | | 1 | DM1,DM6 |
| 24. | 02-02-2017 | Fundamental Rotation Matrices-Euler Angle Representation | | 1 | DM1, DM6 |
| 25. | 03-02-2017 | Tutorial-4 | | 1 | DM2 |
| 26. | 06-02-2017 | D-H representation | | 1 | DM1, DM6 |
| 27. | 07-02-2017 | D-H Representation-Kinematic Modeling | | 1 | DM1,DM6 |
| 28. | 08-02-2017 | Forward Kinematics | | 1 | DM1, DM6 |
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| 30. | 10-02-2017 | Tutorial-4 | | 1 | DM2 |
| 31. | 13-02-2017 | Quiz/Assignment-2 | | 1 | DM3,DM4 |
| | | **UNIT-III** | | | |
| 32. | 14-02-2017 | Introduction and basics of differential motion. | | 1 | DM1, DM6 |
| 33. | 15-02-2017 | Relation between transformation matrix and angular velocity | | 1 | DM1 |

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| 34. | 16-02-2017 | Manipulator Jacobian | | 1 | DM1 |
| 35. | 17-02-2017 | Problems on Jacobian matrix | | 1 | DM1 |
| 36. | 28-02-2017 | Problems on Jacobian matrix | | 1 | DM1 |
| 37. | 01-03-2017 | Problems on Jacobian matrix | | 1 | DM1 |
| 38. | 02-03-2017 | Tutorial-5 | | 1 | DM2 |
| 39. | 03-03-2017 | Introduction and Lagrangian Mechanics | | 1 | DM3,DM4 |
| 40. | 06-03-2017 | Lagrangian Mechanics | | 1 | DM1, DM6 |
| 41. | 07-03-2017 | Lagrange –Euler formulation | | 1 | DM1, DM6 |
| 42. | 08-03-2017 | Lagrange –Euler formulation | | 1 | DM1 |
| 43. | 09-03-2017 | Problems on L-E formulation | | 1 | DM1, DM6 |
| 44. | 10-03-2017 | Problems on L-E formulation | | 1 | DM1 |
| 45. | 13-03-2017 | Tutorial-6 | | 1 | DM2 |
| 46. | 14-03-2017 | Assignment/Quiz-3 | | 1 | DM3,DM4 |
| 47. | 15-03-2017 | **Beyond the syllabus**--Biologically inspired Robot Mechanisms | | 1 | DM1, DM6 |
| | | **UNIT-IV** | | | |
| 48. | 16-03-2017 | Introduction- Considerations in trajectory | | 1 | DM1,DM6 |
| 49. | 17-03-2017 | Joint Interpolated trajectory planning | | 1 | DM1, DM6 |
| 50. | 20-03-2017 | Joint Interpolated trajectory planning | | 1 | DM1 |
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| 52. | 22-03-2017 | Cartesian path trajectory | | 1 | DM1, DM6 |
| 53. | 23-03-2017 | Cartesian path trajectory | | 1 | DM1, DM6 |
| 54. | 24-03-2017 | Tutorial-7 | | 1 | DM2 |
| 55. | 27-03-2017 | Methods of robot programming | | 1 | DM1, DM6 |
| 56. | 29-03-2017 | Lead through method | | 1 | DM1, DM6 |
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| 64. | 10-04-2017 | **Beyond the syllabus**--Robot Vision –How a robot can see like a human | | | DM1, DM6 |
| | | **UNIT-V** | | | |
| 65. | 11-04-2017 | Pneumatic & Hydraulic actuators | | 1 | DM1, DM6 |
| 66. | 12-04-2017 | Servo motors | | 1 | DM1, DM6 |
| 67. | 13-04-2017 | Stepper motors | | 1 | DM1, DM6 |
| 68. | 17-04-2017 | Position sensors: Potentiometers | | 1 | DM1, DM6 |
| 69. | 18-04-2017 | Resolver | | 1 | DM1, DM6 |
| 70. | 19-04-2017 | Encoders | | 1 | DM1, DM6 |
| 71. | 20-04-2017 | Velocity sensors | | 1 | DM1, DM6 |

| | | | | | |
|---|---|---|---|---|---|
| 72. | 21-04-2017 | Tutorial-9 | | 1 | DM2 |
| 73. | 24-04-2017 | Material transfer and machine loading/ unloading applications | | 1 | DM1, DM6 |
| 74. | 25-04-2017 | Processing operations | | 1 | DM1, DM6 |
| 75. | 26-04-2017 | Assembly and inspection – Future applications. | | 1 | DM1, DM6 |
| 76. | 27-04-2017 | Tutorial-10 | | 1 | DM2 |
| 77. | 28-04-2017 | Quiz/Assignment-5 | | 1 | DM3,DM4 |
| | | Beyond the syllabus topics are scheduled at the end of units 3&4<br>Topic 1: Biologically inspired Robot Mechanisms<br>Topic 2: Robot Vision –How a Robot can see like human eye | | | |
| **Total number of classes required to complete the syllabus** | | | | | **75** |
| **Total number of classes available as per Schedule** | | | | | **77** |
| | | | | | |

**NOTE: DELIVERY METHODS**: **DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial, **DM3:** Lecture with a quiz, **DM4**: Assignment/Test, **DM5**: Demonstration (laboratory, field visit), **DM6:** Presentations/PPT

At the End of the course, students attained the **Course Outcomes:CO1,CO2,CO3,CO4and CO5**

**CO1**:Apply robot fundamentals in designing various types of end effectors.
**CO2**:Design the end effectors required for different applications.
**CO3:**Formulate D-H matrices for forward kinematics problems & Develop dynamic equations for robot dynamic problems.
**CO4**:Determine the robot trajectory to robotic motion & Basics of Robot Language.
**CO5**: Select the sensors depending upon robotic application & its uses in various areas.

| **Signature** | | | | | |
|---|---|---|---|---|---|
| | **Course Instructor** | **Course Coordinator** | **Module Coordinator** | **Program Coordinator** | **HOD** |
| | V.Venkatesu | K.V.Viswanadh | B Sudheer Kumar | Dr. S. Pichi Reddy | Dr. K. AppaRao |

**LESSON PLAN**

**Course Code& Course Name:** S141-Automobile Engineering

**Programme: III** B.Tech **Department:** MECHANICAL

**SEM: VI(A/s)** **A.Y: 2016-2017**

| S.No | Tentative Date | Topics to be covered | Actual Date | No of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I: INTRODUCTION, ENGINE CONSTRUCTION** | | | | | |
| 1) | 31-12-16 | Introduction, Components of an Automobile-I | | 1 | DM1,DM6 |
| 2) | 02-01-17 | Components of an Automobile-II | | 1 | DM1 |
| 3) | 02-01-17 | Rear wheel drive, front wheel drive and four wheel drive | | 1 | DM1 |
| 4) | 03-01-17 | Differences between Rear wheel drive and Front wheel drive, Four wheel drive | | 1 | DM6 |
| 5) | 04-01-17 | Frame-Types, Specifications of Automobiles, Types of Automobiles | | 1 | DM1 |
| 6) | 07-01-17 | Working of Internal Combustion engines, Comparison of SI and CI Engines | | 1 | DM1 |
| 7) | 09-01-17 | Comparison of Four-stroke and Two-stroke Engines | | 1 | DM1 |
| 8) | 09-01-17 | Tutorial-I | | 1 | DM2 |
| 9) | 09-01-17 | Cylinder block, Cylinder head, Crank case, Gaskets | | 1 | DM1 |
| 10) | 10-01-17 | Manifolds, Oil-sump, Piston Construction, Piston clearance | | 1 | DM1 |
| 11) | 11-01-17 | Materials for Head, Block & Piston- Advantages & Dis-advantages | | 1 | DM1,DM6 |
| 12) | 17-01-17 | Expansion control in Pistons | | 1 | DM1 |
| 13) | 18-01-17 | Connecting Rod, Crank shaft, Cam-shaft, Flywheel | | 1 | DM6 |
| 14) | 21-01-17 | Valve Construction, Straight poppet valve mechanism | | 1 | DM6 |
| 15) | 23-01-17 | Overhead poppet valve mechanism, Valve tappet Clearance | | 1 | DM1 |
| 16) | 23-01-17 | Supercharging and Turbo-charging | | 1 | DM1 |
| 17) | 24-01-17 | Tutorial-II | | 1 | DM2 |
| **UNIT-II:FUEL SUPPLY SYSTEMS IN PETROL AND DIESEL ENGINES** | | | | | |
| 18) | 25-01-17 | Fuel feed system in petrol engines-Types | | 1 | DM1 |
| 19) | 27-01-17 | Air-fuel mixtures, Mixture requirements at different loads and speeds | | 1 | DM1 |
| 20) | 28-01-17 | Carburetion, Principle of carburetion, Simple Carburettor | | 1 | DM6 |
| 21) | 30-01-17 | Difficulties encountered by simple Carburettor | | 1 | DM6 |

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|---|---|---|---|---|---|
| 22) | 30-01-17 | Zenith and SU type Carburettor | | 1 | DM1 |
| 23) | 31-01-17 | Fuel pumps ( Mechanical and Electrical pumps) | | 1 | DM1 |
| 24) | 01-02-17 | Tutorial-III | | | DM2 |
| 25) | 04-02-17 | Petrol Injection-Introduction | | 1 | DM1 |
| 26) | 06-02-17 | Types of Petrol Injection, Advantages & Disadvantages | | 1 | DM6 |
| 27) | 06-02-17 | Fuel feed system in diesel engine-Requirements | | 1 | DM6 |
| 28) | 07-02-17 | Methods of Diesel Injection system | | 1 | DM1 |
| 29) | 08-02-17 | Nozzle,Types of Nozzles and Spray formation | | 1 | DM1 |
| 30) | 13-02-17 | Fuel Injector and Tutorial-IV | | 1 | DM1,DM2 |
| 31) | 13-02-17 | Air-cleaners in Petrol and Diesel engines and Fuel guages | | 1 | DM1 |
| 32) | 14-02-17 | Fuel filters Petrol and Diesel engines | | 1 | DM3 |
| **20-02-17 to 27-02-17** | | **I-MID EXAMINATIONS** | | | |
| **UNIT-III: IGNITION SYSTEM, ELECTRONICS SYSTEM** | | | | | |
| 33) | 02-03-17 | Requirements of Ignition system,Battery Ignition system | | 1 | DM1 |
| 34) | 03-03-17 | Components of Battery Ignition system | | 1 | DM1 |
| 35) | 04-03-17 | Electronics Ignition system | | 1 | DM6 |
| 36) | 06-03-17 | Magneto Ignition system, Spark Plug Defects | | 1 | DM1 |
| 37) | 06-03-17 | Tutorial-V | | 1 | DM2 |
| 38) | 09-03-17 | Sensors- Electromagnetic Sensors | | 1 | DM1 |
| 39) | 10-03-17 | Combustion knock Sensors & Variable resistance Sensors | | 1 | DM6 |
| 40) | 13-03-17 | Temperature Sensors | | 1 | DM1 |
| 41) | 13-03-17 | Manifold absolute pressure Sensors & Exhaust gas oxygen Sensors | | 1 | DM1 |
| 42) | 16-03-17 | Air-Flow Measurement | | 1 | DM3 |
| 43) | 17-03-17 | Traction control and stability control | | 1 | DM1 |
| 44) | 18-03-17 | Tutorial-VI | | 1 | DM2 |
| **UNIT-IV:ELECTRICAL SYSTEM, TRANSMISSION SYSTEM** | | | | | |
| 45) | 20-03-17 | Starting system-Starter motor | | 1 | DM1 |
| 46) | 20-03-17 | Bendix drive mechanism,solenoid switch | | 1 | DM1 |
| 47) | 23-03-17 | Lighting system,Horn and wiper | | 1 | DM6 |
| 48) | 24-03-17 | Clutches-Requirements of clutches,principle of `Clutch | | 1 | DM1 |
| 49) | 25-03-17 | cone clutch and Problems | | 1 | DM6 |
| 50) | 27-03-17 | Single plate clutch,Multi plate clutch | | 1 | DM6 |
| 51) | 27-03-17 | Tutorial-VII | | 1 | DM2 |

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| 52) | 30-01-17 | Centrifugal clutches | | 1 | DM6 |
| 53) | 31-01-17 | Transmission-Functions of transmission and Various Resistances | | 1 | DM1 |
| 54) | 01-04-17 | Sliding mesh Gear box,Constant mesh gear box | | 1 | DM6 |
| 55) | 03-04-17 | Synchromesh gear box | | 1 | DM6 |
| 56) | 03-04-17 | Automatic transmission-Fluid-Flywheel, Torque convertor | | 1 | DM6 |
| 57) | 06-04-17 | Propeller shaft,Universal joint | | 1 | DM1 |
| 58) | 07-04-17 | HotchKiss drive, Differential | | 1 | DM6 |
| 59) | 10-04-17 | Tutorial-VIII | | 1 | DM2 |
| **UNIT-V: STEERING SYSTEM, SUSPENSION SYSTEM, BRAKING SYSTEM** | | | | | |
| 60) | 13-04-17 | Front axle-Types,Steering geometry-I | | 1 | DM1 |
| 61) | 15-04-17 | Steering geometry-II | | 1 | DM6 |
| 62) | 17-04-17 | Correct steering angle- Davis steering gear mechanism | | 1 | DM1 |
| 63) | 17-04-17 | Types of Steering gears | | 1 | DM1 |
| 64) | 17-04-17 | Power steering and Tutorial-IX | | 1 | DM6, DM2 |
| 65) | 20-04-17 | Suspension system-Leaf springs,Coil springs | | 1 | DM6 |
| 66) | 21-04-17 | Torsion bar,shock absorbers | | 1 | DM1 |
| 67) | 22-04-17 | Independent Suspension systems | | 1 | DM1 |
| 68) | 24-04-17 | Air suspension | | 1 | DM6 |
| 69) | 24-04-17 | Braking system-Requirements,Drum brakes | | 1 | DM1 |
| 70) | 27-04-17 | Disc brakes and Tutorial-X | | 1 | DM1, DM2 |
| 71) | 28-04-17 | Hydraulic braking system circuit & Master cylinder | | 1 | DM6 |
| 72) | 29-04-17 | Air braking system and Anti-lock Braking system | | 1 | DM6 |
| **01-05-17 to 06-05-17** | | **II-MID EXAMINATION** | | | |
| **08-05-17 to 13-05-17** | | **PREPARATION AND PRACTICALS** | | | |
| **15-05-17 to 27-05-17** | | **SEMESTER END EXAMINATIONS** | | | |
| | | **Total** | | 72 | |
| **Total number of classes required to complete the syllabus** | | | | | **60** |
| **Total number of classes available as per Schedule** | | | | | **72** |

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|---|---|
| | **LESSON PLAN** |
| | **Course Code& Course Name:** S141-Automobile Engineering |
| | **Programme: III** B.Tech **Department:** MECHANICAL |
| | **SEM: VI(A/s)** **A.Y: 2016-2017** |

**NOTE: DELIVERY METHODS (DM)**:
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| | | | | | |
|---|---|---|---|---|---|
| Signature | | | | | |
| | Course Instructor | Course Coordinator | Module Coordinator | Programme Coordinator | Head of the Department |
| | K.Soma Sekhar | A.Naresh Kumar | P. Vijay Kumar | Dr S.Pichi Reddy | Dr K.Appa Rao |

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|---|---|---|---|---|---|
| | **LakireddyBalireddy College of Engineering College**<br>L.B.Reddy Nagar, Mylavaram , Krishna District, A.P<br>**FRESHMAN ENGINEERING DEPARTMENT** | | | | |
| | **LESSON PLAN** | | | | |
| | Subject **:** | **ECPS- L119** | | | |
| | Academic Year : | **2016-17** | Semester : | **VI** | **Date: 18.07.2016** |
| | Year : | **III** | Section : | **Mech-A** | **To** |
| | | | | | **.2016** |

**Course Educational Objectives**

In this course, the students will learn to

- Gather information and to organize ideas relevantly and coherently.
- Participate in group discussions, Debates and Face interviews.
- Write project/research reports/technical reports/ formal letters.
- Make oral presentations.
- Transfer information from non-verbal to verbal texts and vice versa.

**Course Outcomes**

After the completion of this course, prospective engineers will have the ability to

- Make power point presentations and oral presentations.
- Articulate English with good pronunciation.
- Face competitive exams like GRE, TOEFL, IELTS etc.
- Face interviews and skillfully manage through group discussions
- Negotiate skillfully for better placement.

**Syllabus:**

- Vocabulary building – synonyms and antonyms, one-word substitutes, analogy, idioms and phrases, verbal & alphabet series.
- Oral Presentations – JAM
- Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Making power point presentations.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, practicing mock-interviews.
- Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, and critical reading.

**Minimum Requirement:**

**The English Language Lab shall have two parts:**

i. **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
ii. **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

**System Requirement (Hardware component):**

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i. P – IV Processor
    1. Speed – 2.8 GHZ
    2. RAM – 512 MB Minimum
    3. Hard Disk – 80 GB
ii. Headphones of High quality

**Suggested Software:**

1.Globarena's software 2. Young India's Clarity software

**Books Recommended:**


1. Stephen Bailey , "Academic Writing- A Practical guide for students", Rontledge Falmer, London & New York, 2004.
2. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, "English Language Communication : A Reader cum Lab Manual, Anuradha Publications, Chennai
3. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi.
4. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup
5. IELTS series with CDs by Cambridge University Press.

| S.No | Teaching Learning Process (TLP) | Delivery Methods (DM) | Assessment Methods (AM) |
|---|---|---|---|
| 1 | Solving Real world problem | Chalk & Talk | Assignments |
| 2 | Explaining application before theory | ICT tools | Quiz |
| 3 | Solving problems | Group discussions | Tutorials |
| 4 | Designing of experiments | Industrial visit | Surprise Tests |
| 5 | Problems on environmental, economics, health & safety | Field work | Mid Exams |
| 6 | Problems on professional & ethics | Case studies | Model Exam |
| 7 | Seminar | Mini Projects | END Exams |
| 8 | Problems using software | Numerical treatment | |
| 9 | Self study | Design / Exercises | |

| S. No. | No. of Lecture Hours | Tentative Dates | Topics | Actual Dates | TLP | DM | AM |
|---|---|---|---|---|---|---|---|
| 1 | 3+3 | 15-07-2016& 20-07-2016 | General Introduction | 15-07-2016& 20-07-2016 | 1 | 1 | |
| 2 | 3+3 | 22-07-2016& 27-07-2016 | JAM/ Synonyms | 22-07-2016& 27-07-2016 | 4,9 | 2,6 | 2,4 |
| 3 | 3+3 | 29-07-2016& 03-08-2016 | JAM/ Synonyms | 29-07-2016& 03-08-2016 | 4,9 | 2,6 | 2,4 |
| 4 | 3+3 | 05-08-2016& 10-08-2016 | Role play/Antonyms | 05-08-2016& 10-08-2016 | 4,9 | 9 | 2,4 |
| 5 | 3+3 | 17-08-2016& 19-07-2016 | Role play/ Antonyms | 17-08-2016& 19-07-2016 | 4,9 | 9 | 2,4 |
| 6 | 3+3 | 24-07-2016& 26-07-2016 | Role play/ Antonyms | 24-07-2016& 26-07-2016 | 7,9 | 2 | 2,4 |
| 7 | 3+3 | 31-08-2016& 02-09-2016 | Group Discussions/Analogy & Idioms | 31-08-2016& 02-09-2016 | 7,9 | 2 | 2,4 |
| 8 | 3+3 | 07-09-2016& 09-09-2016 | Group Discussions/ Analogy & Idioms | 07-09-2016& 09-09-2016 | 7,9 | 2 | 2,4 |
| 9 | 3+3 | 13-09-2016& 16-09-2016 | Group Discussions/ Analogy & Idioms | 13-09-2016& 16-09-2016 | 4,9 | 3 | 2,4 |
| 10 | 3+3 | 21-09-2016& 23-09-2016 | Group Discussions/Analogy & Idioms | 21-09-2016& 23-09-2016 | 4,9 | 3 | 2,3 |
| 11 | 3+3 | 28-09-2016& 30-09-2016 | Group Discussions/ Analogy & Idioms | 28-09-2016& 30-09-2016 | 9 | 3,6 | 6 |
| 12 | 3+3 | 05-10-2016& 07-10-2016 | PPT/ one-word sustitutes | 05-10-2016& 07-10-2016 | 9 | 3,6 | 6 |
| 13 | 3+3 | 19-10-2016& 21-10-2016 | PPT/one-word sustitutes | 19-10-2016& 21-10-2016 | | | 6,7 |
| 14 | 3+3 | 26-10-2016& 28-10-2016 | PPT/ one-word sustitutes | 26-10-2016& 28-10-2016 | | | 6,7 |
| 15 | 3+3 | 02-11-2016& 04-11-2016 | Resume Writing/ Reading Comprehension | 02-11-2016& 04-11-2016 | 4,9 | 3 | 2,4 |
| 16 | 3+3 | 09-11-2016& 11-11-2016 | Mock Interviews/ Verbal reasoning | 09-11-2016& 11-11-2016 | 4,9 | 3 | 2,4 |
| 17 | 3+3 | 16-11-2016& 18-11-2016 | Mock Interviews/ Verbal reasoning | 16-11-2016& 18-11-2016 | 4,9 | 3 | 2,4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **18** | **3+3** | **23-11-2016& 25-11-2016** | **LAB internal exam** | **23-11-2016& 25-11-2016** | | | |

| | **Instructor** | **Course Coordinator** | **Module Coordinator** | **HOD** |
|---|---|---|---|---|
| **Name** | | **Dr.B.Samrajya Lakshmi** | **Dr.B.Samrajya Lakshmi** | **Dr.A.Rami Reddy** |
| **Sign with Date** | | | | |

**LESSON PLAN**

**Course Code& Course Name:** T211-HEAT TRANSFER **SEM:** VI

**Programme:** B.Tech **Department: ME**

Section: A/S Staff Name: Dr.K.Appa Rao

| S.No | Tentative Date | Topics to be covered | Actual Date | Num. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| | | **UNIT-I**: | | | |
| 1 | 27/12/16 | **Introduction** | | 1 | DM1 |
| 2 | 30/12/16 | Basic Modes of heat transfer | | 1 | DM1 |
| 3 | 31/12/16 | Laws of Heat Transfer, thermal diffusivity, thermal cond. | | 1 | DM1 |
| 4 | 2/1/17 | Applications of heat Transfer & Steady ,Unsteady and Periodic Heat Transfer | | 1 | DM1 |
| 5 | 2/1/17 | Rate equations: conduction, convection and radiation | | 1 | DM1 |
| 6 | 3/1/17 | General Heat Conduction equation in Cartesian Coordinates | | 1 | DM1 |
| 7 | 4/1/17 | Heat diffusion equation, boundary and initial conditions | | 1 | DM1 |
| 8 | 6/1/17 | Problems on Composite Walls | | 1 | DM2 |
| | | **One dimensional steady state conduction** | | | |
| 9 | 7/1/17 | ID Steady state Heat flow through the plane wall with constant Thermal Conductivity without internal heat generation | | 1 | DM1 |
| 10 | 9/1/17 | ID Steady state Heat flow through the plane wall with constant Thermal Conductivity with internal heat generation | | 1 | DM1,DM6 |
| 11 | 10/1/17 | Problems on composite wall | | 1 | DM1 |
| 12 | 17/1/17 | General Heat Conduction equation in Cylindrical Coordinates | | 1 | DM1 |
| 13 | 20/1/17 | General Heat Conduction equation in Spherical Coordinates | | 1 | DM1 |
| 14 | 21/1/17 | **Tutorial -1** | | 1 | DM2 |
| 15 | 23/1/17 | Problems on plane wall with internal heat generation | | 1 | DM1 |
| 16 | 23/1/17 | Problems on Critical Radius of Insulation | | 1 | DM1 |
| | | **UNIT-II** | | | |
| 17 | 24/1/17 | Heat flow through the plane wall and cylinder with variable Thermal Conductivity | | 1 | DM1 |
| 18 | 27/1/17 | Uniform Internal Heat generation in slabs | | 1 | DM1 |
| 19 | 28/1/17 | Problems on cylinder with internal heat generation | | 1 | DM1 |
| 20 | 30/1/17 | **Tutorial -2** | | 1 | DM2 |
| 21 | 30/1/17 | Sphere with internal heat generation | | 1 | DM1 |
| 22 | 31/1/17 | critical thickness of insulation for cylinder | | 1 | DM1 |
| 23 | 1/2/17 | problems - | | 1 | DM1 |
| 24 | 1/2/17 | Temperature distribution equation for fins | | 1 | DM1,DM6 |
| 25 | 3/2/17 | Derivation of long fins | | 1 | DM1 |
| 26 | 4/2/17 | **Tutorial -3** | | 1 | DM2 |
| 27 | 6/2/17 | Derivation of short fins -problems | | 1 | DM1 |
| 28 | 7/2/17 | Fin efficiency and effectiveness | | 1 | DM1 |
| 29 | 10/2/17 | Problems on fins and effectiveness | | 1 | DM1 |
| 30 | 10/2/17 | Systems with negligible internal Resistance | | 1 | DM1 |
| 31 | 11/2/17 | Lumped Heat Analysis | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 13/2/17 | Problems on Lumped heat capacity analysis | | 1 | DM1,DM6 |
| 33 | 13/2/17 | Plane wall with finite surface and Internal Resistance using Heisler Charts | | 1 | DM1 |
| 34 | 14/2/17 | Heisler chart problems | | 1 | DM1 |
| 35 | 14/2/17 | **Tutorial -4** | | | |
| 36 | 15/2/17 | **Revision of two units** | | 1 | DM1,DM6 |
| | | **UNIT III** | | | |
| | | **Assignments** | | | |
| 37 | 18/2/17 | Types of Convective Heat Transfer | | 1 | DM1 |
| 38 | 20/2/17 | Dimensional Analysis | | 1 | DM1 |
| 39 | 20/2/17 | Buckingham PI theorem applied to Forced Convection | | 1 | DM1 |
| 40 | 21/2/17 | Significance of Non Dimensional Numbers | | 1 | DM1,DM6 |
| 41 | 27/2/17 | Velocity and Thermal Boundary Layers | | 1 | DM1 |
| | | **Forced Convection** | | | |
| 42 | 27/2/17 | External Flow –Laminar and Turbulent Flow over a Flat Plate | | 1 | DM1 |
| 43 | 28/2/17 | Internal Flow through circular pipe –Laminar and Turbulent Flows - | | 1 | DM1 |
| 44 | 3/3/17 | Entry Lengths and Fully developed Flows | | 1 | DM1 |
| 45 | 4/3/17 | Reynolds Colburn Analogy | | 1 | DM1 |
| 46 | 6/3/17 | **Tutorial -5** | | 1 | DM2 |
| | | **Natural Convection** | | | |
| 47 | 7/3/17 | Development of Hydrodynamic and Thermal Boundary Layer along a vertical plate | | 1 | DM1 |
| 48 | 10/3/17 | Empirical Correlations for vertical plates | | 1 | DM1 |
| 49 | 11/3/17 | Empirical Correlations | | 1 | DM1 |
| 50 | 13/3/17 | Empirical Correlations for Horizontal plates | | 1 | DM1 |
| 51 | 14/3/17 | Empirical Correlations for Horizontal Cylinder | | 1 | DM1 |
| 52 | 16/3/17 | **Tutorial -6** | | 1 | DM2 |
| | | **UNIT IV** | | | |
| | | **Boiling and Condensation** | | 1 | DM1 |
| 53 | 18/3/17 | Boiling heat Transfer Phenomenon | | 1 | DM1,DM6 |
| 54 | 18/3/17 | Pool Boiling | | 1 | DM1,DM6 |
| 55 | 20/3/17 | Different regimes of boiling | | 1 | DM1,DM6 |
| 56 | 20/3/17 | Critical Heat Flux | | 1 | DM1 |
| 57 | 21/3/17 | Film wise and Drop wise Condensation | | 1 | DM1,DM6 |
| 58 | 22/3/17 | Laminar Film wise condensation on Vertical Plates | | 1 | DM1 |
| 59 | 23/3/17 | **Tutorial -7** | | 1 | DM2 |
| | | **Radiation Heat Exchange** | | | |
| 60 | 24/3/17 | Nature of Thermal Radiation | | 1 | DM1 |
| 61 | 25/3/17 | Emissive Power-Absorption, Reflection and Transmission | | 1 | DM1 |
| 62 | 27/3/17 | Definitions related to Radiation | | 1 | DM1 |
| 63 | 31/3/17 | Configuration factor. or Geometry Factor or View Factor or Shape Factor | | 1 | DM1,DM6 |
| 64 | 31/3/17 | Laws of Black Body Radiation | | 1 | DM1 |
| 65 | 2/4/17 | Radiation heat exchange between two parallel plates, | | 1 | DM1,DM6 |
| 66 | 3/4/17 | Radiation heat exchange between two black isothermal surfaces | | 1 | DM1,DM6 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 7/4/17 | Radiation heat exchange between non black infinite parallel plates | | 1 | DM1,DM6 |
| 68 | 10/4/17 | Radiation shielding | | 1 | DM1 |
| 69 | 11/4/17 | **Tutorial -9** | | 1 | DM2 |
| | | **UNIT-V** | | | |
| 70 | 17/4/17 | Classification of Heat Exchangers | | 1 | DM1,DM6 |
| 71 | 18/4/17 | LMTD method for parallel flow Heat Exchangers | | 1 | DM1 |
| 72 | 18/4/17 | LMTD method for counter flow heat exchangers | | 1 | DM1,DM6 |
| 73 | 19/4/17 | LMTD for use with multi pass and cross flow Heat Exchangers | | 1 | DM1,DM6 |
| 74 | 19/4/17 | LMTD Parallel flow problems. | | 1 | DM2 |
| 75 | 21/4/17 | LMTD Counter flow problems | | 1 | DM1 |
| 76 | 21/4/17 | Problems on NTU method | | 1 | DM1 |
| 77 | 24/4/17 | Problems on Effectiveness of Heat Exchangers | | 1 | DM1 |
| 78 | 25/4/17 | **Tutorial -10** | | 1 | DM2 |
| 79 | 28/4/17 | Revision of topics | | 1 | DM1, DM6 |
| 80 | 29/4/17 | Advanced heat transfer topics –Printed circuit boards, unsteady heat transfer in Nuclear fuel rods | | 1 | DM6 |
| | | | **Total** | 80 | |
| **Total number of classes required to complete the syllabus** | | | | | **68** |
| **Total number of classes available as per Schedule** | | | | | **80** |

**NOTE: DELIVERY METHODS**: **DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial, **DM3:** Lecture with a quiz, **DM4**: Assignment/Test, **DM5**: Demonstration (laboratory, field visit), **DM6:** Presentations/PPT

At the End of the course, students attained the **Course Outcomes: CO1, CO2, CO3, CO4, CO5** & sample proofs are enclosed in Course file.

| **Signature** | | | |
|---|---|---|---|
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Dr.K.Appa Rao | Dr.K.Appa Rao | Dr.K.Appa Rao |

**LESSON PLAN**

**Course Code& Course Name:** T211-HEAT TRANSFER **SEM:** VI

**Programme:** B.Tech **Department: ME**

Section: B/S Staff Name: Dr.K.Appa Rao

| S.No | Tentative Date | Topics to be covered | Actual Date | Num. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| | | **UNIT-I**: | | | |
| 1 | 27/12/16 | **Introduction** | | 1 | DM1 |
| 2 | 28/12/16 | Basic Modes of heat transfer | | 1 | DM1 |
| 3 | 29/12/16 | Laws of Heat Transfer, thermal diffusivity, thermal cond. | | 1 | DM1 |
| 4 | 31/12/16 | Applications of heat Transfer & Steady ,Unsteady and Periodic Heat Transfer | | 1 | DM1 |
| 5 | 2/1/17 | Rate equations: conduction, convection and radiation | | 1 | DM1 |
| 6 | 3/1/17 | General Heat Conduction equation in Cartesian Coordinates | | 1 | DM1 |
| 7 | 3/1/17 | Heat diffusion equation, boundary and initial conditions | | 1 | DM1 |
| 8 | 4/1/17 | Problems on Composite Walls | | 1 | DM2 |
| | | **One dimensional steady state conduction** | | | |
| 9 | 5/1/17 | ID Steady state Heat flow through the plane wall with constant Thermal Conductivity without internal heat generation | | 1 | DM1 |
| 10 | 9/1/17 | ID Steady state Heat flow through the plane wall with constant Thermal Conductivity with internal heat generation | | 1 | DM1,DM6 |
| 11 | 10/1/17 | Problems on composite wall | | 1 | DM1 |
| 12 | 11/1/17 | General Heat Conduction equation in Cylindrical Coordinates | | 1 | DM1 |
| 13 | 17/1/17 | General Heat Conduction equation in Spherical Coordinates | | 1 | DM1 |
| 14 | 19/1/17 | **Tutorial -1** | | 1 | DM2 |
| 15 | 21/1/17 | Problems on plane wall with internal heat generation | | 1 | DM1 |
| 16 | 23/1/17 | Problems on Critical Radius of Insulation | | 1 | DM1 |
| | | **UNIT-II** | | | |
| 17 | 24/1/17 | Heat flow through the plane wall and cylinder with variable Thermal Conductivity | | 1 | DM1 |
| 18 | 25/1/17 | Uniform Internal Heat generation in slabs | | 1 | DM1 |
| 19 | 27/1/17 | Problems on cylinder with internal heat generation | | 1 | DM1 |
| 20 | 28/1/17 | **Tutorial -2** | | 1 | DM2 |
| 21 | 30/1/17 | Sphere with internal heat generation | | 1 | DM1 |
| 22 | 31/1/17 | critical thickness of insulation for cylinder | | 1 | DM1 |
| 23 | 2/2/17 | problems - | | 1 | DM1 |
| 24 | 3/2/17 | Temperature distribution equation for fins | | 1 | DM1,DM6 |
| 25 | 4/2/17 | Derivation of long fins | | 1 | DM1 |
| 26 | 4/2/17 | **Tutorial -3** | | 1 | DM2 |
| 27 | 6/2/17 | Derivation of short fins -problems | | 1 | DM1 |
| 28 | 7/2/17 | Fin efficiency and effectiveness | | 1 | DM1 |
| 29 | 8/2/17 | Problems on fins and effectiveness | | 1 | DM1 |
| 30 | 10/2/17 | Systems with negligible internal Resistance | | 1 | DM1 |

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|---|---|---|---|---|---|
| 31 | 10/2/17 | Lumped Heat Analysis | | 1 | DM1 |
| 32 | 13/2/17 | Problems on Lumped heat capacity analysis | | 1 | DM1,DM6 |
| 33 | 14/2/17 | Plane wall with finite surface and Internal Resistance using Heisler Charts | | 1 | DM1 |
| 34 | 15/2/17 | Heisler chart problems | | 1 | DM1 |
| 35 | 16/2/17 | **Tutorial -4** | | 1 | DM2 |
| 36 | 16/2/17 | **Revision of two units** | | 1 | DM1,DM6 |
| | | **UNIT III** | | | |
| | | **Assignments** | | | |
| 37 | 18/2/17 | Types of Convective Heat Transfer | | 1 | DM1 |
| 38 | | Dimensional Analysis | | 1 | DM1 |
| 39 | 20/2/17 | Buckingham PI theorem applied to Forced Convection | | 1 | DM1 |
| 40 | 21/2/17 | Significance of Non Dimensional Numbers | | 1 | DM1,DM6 |
| 41 | 22/2/17 | Velocity and Thermal Boundary Layers | | 1 | DM1 |
| | | **Forced Convection** | | 1 | DM2 |
| 42 | 23/2/17 | External Flow –Laminar and Turbulent Flow over a Flat Plate | | 1 | DM1 |
| 43 | 27/2/17 | Internal Flow through circular pipe –Laminar and Turbulent Flows - | | 1 | DM1 |
| 44 | 28/2/17 | Entry Lengths and Fully developed Flows | | 1 | DM1 |
| 45 | 1/3/17 | Reynolds Colburn Analogy | | 1 | DM1 |
| 46 | 2/3/17 | **Tutorial -5** | | 1 | DM2 |
| | | **Natural Convection** | | 1 | DM1 |
| 47 | 4/3/17 | Development of Hydrodynamic and Thermal Boundary Layer along a vertical plate | | 1 | DM1 |
| 48 | 6/3/17 | Empirical Correlations for vertical plates | | 1 | DM1 |
| 49 | 7/3/17 | Empirical Correlations | | 1 | DM1 |
| 50 | 8/3/17 | Empirical Correlations for Horizontal plates | | 1 | DM1 |
| 51 | 11/3/17 | Empirical Correlations for Horizontal Cylinder | | 1 | DM1 |
| 52 | 13/3/17 | **Tutorial -6** | | 1 | DM2 |
| | | **UNIT IV** | | | |
| | | **Boiling and Condensation** | | 1 | DM1 |
| 53 | 14/3/17 | Boiling heat Transfer Phenomenon | | 1 | DM1,DM6 |
| 54 | 15/3/17 | Pool Boiling | | 1 | DM1,DM6 |
| 55 | 16/3/17 | Different regimes of boiling | | 1 | DM1,DM6 |
| 56 | 18/3/17 | Critical Heat Flux | | 1 | DM1 |
| 57 | 20/3/17 | Film wise and Drop wise Condensation | | 1 | DM1,DM6 |
| 58 | 21/3/17 | Laminar Film wise condensation on Vertical Plates | | 1 | DM1 |
| 59 | 22/3/17 | **Tutorial -7** | | 1 | DM2 |
| | | **Radiations** | | 1 | DM1 |
| 60 | 23/3/17 | Nature of Thermal Radiation | | 1 | DM1 |
| 61 | 25/3/17 | Emissive Power-Absorption, Reflection and Transmission | | 1 | DM1 |
| 62 | 27/3/17 | Definitions related to Radiation | | 1 | DM1 |
| 63 | 28/3/17 | Configuration factor. or Geometry Factor or View Factor or Shape Factor | | 1 | DM1,DM6 |
| 64 | 30/3/17 | Laws of Black Body Radiation | | 1 | DM1 |
| 65 | 31/3/17 | Radiation heat exchange between two parallel plates | | 1 | DM1,DM6 |

| | | | | | |
|---|---|---|---|---|---|
| 66 | 3/4/17 | Radiation heat exchange between two black isothermal surfaces | | 1 | DM1,DM6 |
| 67 | 4/4/17 | Radiation heat exchange between non black infinite parallel plates | | 1 | DM1,DM6 |
| 68 | 6/4/17 | Radiation shielding | | 1 | DM1 |
| 69 | 10/4/17 | **Tutorial -9** | | 1 | DM2 |
| | | **UNIT-V** | | | |
| 70 | 11/4/17 | Classification of Heat Exchangers | | 1 | DM1,DM6 |
| 71 | 12/4/17 | LMTD method for parallel flow Heat Exchangers | | 1 | DM1 |
| 72 | 17/4/17 | LMTD method for counter flow heat exchangers | | 1 | DM1,DM6 |
| 73 | 18/4/17 | LMTD for use with multi pass and cross flow Heat Exchangers | | 1 | DM1,DM6 |
| 74 | 19/4/17 | LMTD Parallel flow problems. | | 1 | DM2 |
| 75 | 20/4/17 | LMTD Counter flow problems | | 1 | DM1 |
| 76 | 21/4/17 | Problems on NTU method | | 1 | DM1 |
| 77 | 24/4/17 | Problems on Effectiveness of Heat Exchangers | | 1 | DM1 |
| 78 | 25/4/17 | **Tutorial -10** | | 1 | DM2 |
| 79 | 27/4/17 | Revision of topics | | 1 | DM1 |
| 80 | 29/4/17 | Revision of topics | | | |
| 81 | | Advanced heat transfer topics –Printed circuit boards, unsteady heat transfer in Nuclear fuel rods | | 1 | DM6 |
| | | | **Total** | 81 | |
| **Total number of classes required to complete the syllabus** | | | | | **69** |
| **Total number of classes available as per Schedule** | | | | | **81** |

**NOTE: DELIVERY METHODS**: **DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial, **DM3:** Lecture with a quiz, **DM4**: Assignment/Test, **DM5**: Demonstration (laboratory, field visit), **DM6:** Presentations/PPT

At the End of the course, students attained the **Course Outcomes: CO1, CO2, CO3, CO4, CO5** & sample proofs are enclosed in Course file.

| **Signature** | | | |
|---|---|---|---|
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Dr.K.Appa Rao | Dr.K.Appa Rao | Dr.K.Appa Rao |

**LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING**
**MYLAVARAM**

**LIST OF EXPERIMENTS**

**Department: Mechanical** **Lab: Heat Transfer**
**Course : VI SEM** **A.Y: 2016-17**

**I CYCLE:**

1. Determination of Thermal Conductivity of Insulating Powder (Asbestos).
2. Determination of Thermal Conductivity of Metal Bar (Brass).
3. Determination of Thermal Conductivity of given Liquids (Engine Oil).
4. (A) Test on Heat Pipe Apparatus.

   (B) Determination of Thermal Conductance of a Composite Wall.
5. Study of Transient Heat Conduction (Unsteady Heat Conduction).

**II CYCLE:**

1. Test on Stefan Boltzmann Apparatus.
2. Test on Pin-Fin Apparatus.
3. Determination of Convective Heat Transfer Co-efficient of air in Natural Convection.
4. Test on Emissivity Measurement Apparatus.
5. (A) Test on Tube in Tube Parallel Flow Heat Exchanger.
   (B) Test on Tube in Tube Counter Flow Heat Exchanger.

**Lab-Incharge**

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**

**MYLAVARAM-521230**

**DEPARTMENT OF MECHANICAL ENGINEERING**

**HEAT TRANSFER LABORATORY**

**Course: VI SEM (A-Section)** **A.Y: 2016-17**

**I Cycle Schedule: BATCH-A**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| | Demo | Demo | Demo | Demo | Demo | Demo |
| 10/12/2016 | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ |
| 17/01/2017 | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ |
| 24/01/2017 | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ |
| 31/01/2017 | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ |
| 07/02/2017 | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ |
| 14/02/2017 | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ |

**I Cycle Schedule: BATCH-B**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| 07/01/2017 | Demo | Demo | Demo | Demo | Demo | Demo |
| 21/01/2017 | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ |
| 28/02/2017 | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ |
| 04/03/2017 | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ |
| 04/03/2017 | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ |
| 11/03/2017 | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ |
| 11/03/2017 | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ |

**Lab-Incharge**

**II Cycle Schedule: BATCH-A**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| | Demo | Demo | Demo | Demo | Demo | Demo |
| 05/03/17 | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ |
| 11/03/17 | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ |
| 21/03/17 | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ |
| 21/03/17 | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ |
| 28/03/17 | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ |
| 28/03/17 | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ |
| | ***INTERNAL TEST*** | | | | | |

**II Cycle Schedule: BATCH-B**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| | Demo | Demo | Demo | Demo | Demo | Demo |
| 18/03/2017 | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ |
| 18/03/2017 | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ |
| 01/04/2017 | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ |
| 01/04/2017 | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ |
| 08/04/2017 | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ |
| 08/04/2017 | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ |
| | ***INTERNAL TEST*** | | | | | |

**Lab-Incharge**

**LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**
**DEPARTMENT OF MECHANICAL ENGINEERING**
**LESSON PLAN**

**COURSE: MACHINE DESIGN-II(S292)** **Programme: UG**
**CLASS: B. Tech SEM: VI (Section – A)** **A.Y : 2016-17**
**Faculty Name : SIVA SANKARA BABU CH** **Branch: Mechanical Engineering**

| S No. | Tentative Date | Topics to be covered | Actual Date | No. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I:SLIDING AND ROLLING CONTACT BEARING** | | | | | |
| 1 | 28-12-2016 | Course educational objectives and outcomes | | 1 | DM1, DM6 |
| 2 | 29-12-2016 | Introduction to machine design, Objectives, their applications and various machine elements | | 1 | DM1, DM6 |
| 3 | 30-12-2016 | Viscosity and lubrication, bearing characteristic number,Sommerfield number- | | 1 | DM1, DM6 |
| 4 | 31-12-2016 | Types of bearings & Full, partial and fitted journal bearing | | 1 | DM1, DM6 |
| 5 | 02-01-2017 | Bearing modulus, bearing materials, factors, | | 1 | DM1, DM6 |
| 6 | 04-01-2017 | Design of journal bearing | | 1 | DM1 |
| 7 | 05-01-2017 | Mass of oil supplied - problems | | 1 | DM1 |
| 8 | 06-01-2017 | Heat generation and dissipation –problems | | 1 | DM1 |
| 9 | 07-01-2017 | Dimensionless parameters used in the bearing design – problem | | 1 | DM1 |
| 10 | 09-01-2017 | TUTORIAL-1 | | 1 | DM2 |
| 11 | 11-01-2017 | Rolling contact bearings, types and bearing life | | 1 | DM1 |
| 12 | 18-01-2017 | Materials used and designation of rolling bearings | | 1 | DM1, DM6 |
| 13 | 19-01-2017 | Static load and dynamic load capacity | | 1 | DM1 |
| 14 | 20-01-2017 | Selection of ball bearing - problems | | 1 | DM1 |
| 15 | 21-01-2017 | Selection of roller bearing - problems | | 1 | DM1 |
| 16 | 23-01-2017 | TUTORIAL-2 | | | DM2 |
| 17 | 25-01-2017 | Cubic mean load derivation - problems | | 1 | DM1 |
| 18 | 27-01-2017 | Reliability of bearings - problems | | 1 | DM1 |
| 19 | 28-01-2017 | Assignment -1/ Quiz-1 | | 1 | DM3, DM4 |
| **UNIT-II: ENGINE PARTS DESIGN** | | | | | |
| 20 | 30-01-2017 | **PISTON**: introduction to piston design, piston design | | 1 | DM1, DM6 |
| 21 | 01-02-2017 | Forces acting on the piston, construction design | | 1 | DM1 |
| 22 | 02-02-2017 | Properties of piston, Design of piston | | 1 | DM1 |
| 23 | 03-02-2017 | Piston design - problems | | 1 | DM1 |
| 24 | 04-02-2017 | Cylinder design, cylinder liners-design | | 1 | DM1 |
| 25 | 06-02-2017 | TUTORIAL-3 | | | DM2 |
| 26 | 08-02-2017 | **CONNECTING ROD**: Thrust in C.R, buckling load | | 1 | DM1 |
| 27 | 09-02-2017 | Stresses due to whipping action on connecting rod ends- problems | | 1 | DM1 |
| 28 | 10-02-2017 | **CRANK SHAFT:** Design of crank and crank shaft | | 1 | DM1 |
| 29 | 13-02-2017 | Strength of overhung shaft-problem | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 30 | 15-02-2017 | Strength of center crank shaft, crank pins-problem | | 1 | DM1 |
| 31 | 16-02-2017 | TUTORIAL-4 | | 1 | DM2 |
| 32 | 17-02-2017 | Assignment-2/Quiz-2 | | 1 | DM3, DM4 |
| 33 | 18-02-2017 | **Beyond Syllabus**: Flywheel design | | 1 | DM1 |
| | 20-02-2017 to 27-02-2017 | MID-I Examinations | | | |
| **UNIT-III: PULLEYS AND WIRE ROPES** | | | | | |
| 34 | 01-03-2017 | **PULLEYS:** Introduction | | 1 | DM1, DM6 |
| 35 | 02-03-2017 | Flat belt pulley , materials | | 1 | DM1, DM6 |
| 36 | 03-03-2017 | Design of pulleys for flat belt drive | | 1 | DM1 |
| 37 | 04-03-2017 | V-belts –designation and design | | 1 | DM1 |
| 38 | 06-03-2017 | Design of V- grooved pulley | | 1 | DM1 |
| 39 | 08-03-2017 | TUTORIAL-5 | | 1 | DM2 |
| 40 | 09-03-2017 | **WIRE ROPES: I**ntroduction**,** classification, designation | | 1 | DM1 |
| 41 | 10-03-2017 | Selection of wire ropes | | 1 | DM1 |
| 42 | 13-03-2017 | Stresses in hoisting ropes | | 1 | DM1 |
| 43 | 15-03-2017 | Design of wire ropes-problems | | 1 | DM1 |
| 44 | 16-03-2017 | TUTORIAL-6/ **Assignment-3/Quiz-3** | | 1 | DM2, DM3, DM4 |
| **UNIT-IV: MECHANICAL SPRINGS** | | | | | |
| 45 | 17-03-2017 | **SPRINGS:** Introduction, classification | | 1 | DM1, DM6 |
| 46 | 18-03-2017 | Stresses in springs and derivations | | 1 | DM1, DM6 |
| 47 | 20-03-2017 | Deflection and stiffness of springs | | 1 | DM1 |
| 48 | 22-03-2017 | Springs for fatigue loading | | 1 | DM1 |
| 49 | 23-03-2017 | TUTORIAL-**7** | | 1 | DM2 |
| 50 | 24-03-2017 | Spring failures, design of spring | | 1 | DM1 |
| 51 | 25-03-2017 | Natural frequency of helical spring | | 1 | DM1 |
| 52 | 27-03-2017 | Energy storage capacity in springs | | 1 | DM1 |
| 53 | 30-03-2017 | Tension and torsion springs | | 1 | DM1 |
| 54 | 31-03-2017 | TUTORIAL-8 | | 1 | DM2 |
| 55 | 01-04-2017 | Co-axial springs design- Problems | | 1 | DM1 |
| 56 | 03-04-2017 | Design of leaf springs- Problems | | 1 | DM1 |
| 57 | 06-04-2017 | **Assignment-4/Quiz-4** | | 1 | DM3, DM4 |
| **UNIT-V: SPUR & HELICAL GEARS, GEAR BOX** | | | | | |
| 58 | 07-04-2017 | **GEARS**: Introduction and terminology | | 1 | DM1, DM6 |
| 59 | 10-04-2017 | Types of gears, design formulae | | 1 | DM1, DM6 |
| 60 | 12-04-2017 | Design Analysis of gears, Estimation of centre distance, module& face width | | 1 | DM1 |
| 61 | 13-04-2017 | Design procedure of spur gears. | | 1 | DM1 |
| 62 | 15-04-2017 | Design of spur gears - problems. | | 1 | DM1 |
| 63 | 17-04-2017 | Design procedure of helical gears. | | 1 | DM1 |
| 64 | 19-04-2017 | TUTORIAL-9 | | 1 | DM2 |
| 65 | 20-04-2017 | Check for dynamic and wear considerations | | 1 | DM1 |
| 66 | 21-04-2017 | **GEAR BOX**: Functions, Progress ratio | | 1 | DM1 |
| 67 | 22-04-2017 | Speeddiagram, Kinematic arrangement | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 68 | 24-04-2017 | Gear box design procedure -problems | | 1 | DM1 |
| 69 | 26-04-2017 | TUTORIAL-10/Assignment-5/Quiz-5 | | 1 | DM2, DM3, DM4 |
| 70 | 27-04-2017 | **Beyond the syllabus**: Design of Worm gear | | 1 | DM1 |
| 71 | 28-04-2017 | **Beyond the syllabus**: Design of Worm gear | | 1 | DM1 |
| | 29-04-2017 | REVISION | | 1 | DM1 |
| | 11-04-2016 TO 18-04-2016 | MID-II EXAMINATIONS | | | |
| | | | **Total** | 71 | |
| **Total number of classes available as per Schedule** (Including Tutorials-10; Assignment and Quiz -3; Beyond Syllabus :3) | | | | | **71** |
| **Total number of classes required to complete the syllabus** | | | | | **55** |

**NOTE: DELIVERY METHODS** :

**DM1**: Lecture interspersed with discussions/BB,
**DM2:** Tutorial,
**DM3:** Lecture with a quiz,
**DM4**: Assignment/Test,
**DM5**: Demonstration (laboratory, field visit),
**DM6:** Presentations/PPT

**Course Educational Objectives:**The objectives of this course are

1. To understand the hydrodynamic lubrication in bearings
2. To understand the concepts related to journal bearings and rolling contact bearings
3. To understand the design considerations of the engine components.
4. To gain the knowledge on the principles and procedure for the design of power transmission elements
5. To understand the gears with respect to tooth bending strength and surface strength specifications and fatigue consideration

**Course Outcomes:**At the end of this course students will be able to

1. Design hydrodynamic journal bearings and evaluate the life of the antifriction bearings
2. Design the internal combustion engine components for safe and continuous operation
3. Select the wire ropes for elevators, cranes and hoisting machinery
4. Design the springs with respect to static and dynamic loads
5. Apply the design concepts to evaluate the strength of the gear

| | Course Instructor | Course coordinator | Module coordinator | Programme Coordinator | HOD |
|---|---|---|---|---|---|
| **Signature** | | | | | |
| **NAME** | **CH. SIVA SANKAR** | **K.V.VISWANDH** | **B. SUDHEER KUMAR** | **Dr. S. PICHI REDDY** | **Dr. K. APPARAO** |

# LESSON PLAN

**Course Name:** S317 - MODERN MACHINING PROCESSES, **SEM:** 6
**Programme:** B.Tech **A.Y:2016-17** **Department:** MECH-B

| S No. | Tentative Date | Topics to be covered | Actual Date | No. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **Unit-I** | | | | | |
| 1 | 28-12-2016 | **MODERN MACHINING PROCESS** -Introduction | | 1 | DM1 |
| 2 | 29-12-2016 | Explained need of conventional machining processes | | 1 | DM1 |
| 3 | 30-12-2016 | Classification of conventional machining processes, Types of energies used in Modern machining process. | | 1 | DM1 |
| 4 | 31-12-2016 | Considerations in process selection, Explained Comparison between conventional machining and non conventional machining processes. | | 1 | DM1 |
| 5 | 02-01-2017 | Basic principle of ultrasonic machining, equipment setup and procedure | | 1 | DM1 |
| 6 | *04-01-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 7 | 05-01-2017 | Process variables, applications and MRR calculations. | | 1 | DM1 |
| 8 | 06-01-2017 | Basic principle of Abrasive jet machining, equipment setup and procedure. | | 1 | DM1 |
| 9 | 07-01-2017 | Process variables, MRR calculations, Applications and Advantages, | | 1 | DM2 |
| 10 | 09-01-2017 | Water jet machining Basic principle, equipment setup and procedure | | 1 | DM1 |
| 11 | *11-01-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 12 | 12-01-2017 | Process variables and applications.MRR calculations. | | 1 | DM1 |
| 13 | 16-01-2017 | REVISION | | 1 | DM6 |
| 14 | *18-01-2017 | TUTORIAL | | 1 | DM2 |
| 15 | 19-01-2017 | Assignment/ test | | 1 | DM4 |
| **Unit-II** | | | | | |
| 16 | 20-01-2017 | **Electrochemical Process** Introduction | | 1 | DM1 |
| 17 | 21-01-2017 | Basic principle of Electrochemical machining, equipment setup and procedure | | 1 | DM1 |
| 18 | 23-01-2017 | Process, applications and MRR calculations. | | 1 | DM1 |
| 19 | *25-01-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 20 | 27-01-2017 | Basic principle of Electrochemical grinding, equipment setup and procedure. | | 1 | DM1 |

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|---|---|---|---|---|---|
| 21 | 28-01-2017 | Process variables, MRR calculations, Applications and Advantages, | | 1 | DM1 |
| 22 | 30-01-2017 | Basic principle of Electrochemical Deburring, equipment setup and procedure. | | 1 | DM1 |
| 23 | *01-02-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 24 | 02-02-2017 | Basic principle of Electrochemical Honing, equipment setup and procedure | | 1 | DM1 |
| 25 | 03-02-2017 | Process material removal rate in electrochemical Honing. | | 1 | DM1 |
| 26 | 04-02-2017 | CHEMICAL MACHINING- introduction-principle- mask ants and etchants. | | 1 | DM1 |
| 27 | 06-02-2017 | Advantages and applications of Chemical machining. | | 1 | DM3 |
| 28 | *08-02-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 29 | 09-02-2017 | Electrical Discharge Machining – Introduction, General principle. | | 1 | DM1 |
| 30 | 10-02-2017 | Applications of EDM. | | 1 | DM1 |
| 31 | 11-02-2017 | Power circuits for Electric Discharge Machining, | | 1 | DM1 |
| 32 | 13-02-2017 | MRR in EDM | | 1 | DM1 |
| 33 | *15-02-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 34 | 16-02-2017 | Process parameters, Selection of tool, electrodes and electrical fluids. | | | |
| 35 | 17-02-2017 | Principle of ED Wire cutting machine. | | 1 | DM1 |
| 36 | 18-02-2017 | Applications of ED wire cutting. | | 1 | DM1 |
| | | **UNIT-III** | | | |
| 37 | 06-03-2017 | **ELECTRON BEAM**- principle . | | 1 | DM1 |
| 38 | 08-03-2017 | Process of EBM | | 1 | DM1 |
| 39 | *09-03-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 40 | 10-03-2017 | Equipment setup of EBM and applications. | | 1 | DM1 |
| 41 | 13-03-2017 | LASER BEAM Machining- principle and Process of LBM | | 1 | DM1 |
| 42 | 15-03-2017 | Equipment and applications of LBM | | 1 | DM1 |
| 43 | 16-03-2017 | PLASMA ARC Machining- principle | | 1 | DM1 |
| 44 | 17-03-2017 | Process of PAM | | 1 | DM1 |

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|---|---|---|---|---|---|
| 45 | 18-03-2017 | Equipment and applications of PAM | | 1 | DM1 |
| 46 | 20-03-2017 | HOT MACHINING- Introduction. | | 1 | DM1 |
| 47 | 22-03-2017 | Distinguish between PAM and EBM | | 1 | DM1 |
| 48 | *23-03-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 49 | 24-03-2017 | REVISION | | 1 | DM6 |
| **Unit-IV** | | | | | |
| 50 | 25-03-2017 | **RAPID PROTO TYPING**- Introduction,. | | 1 | DM1 |
| 51 | 27-03-2017 | Proto type fundamentals | | 1 | DM1 |
| 52 | 29-03-2017 | Historical developments | | 1 | DM1 |
| 53 | *30-03-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 54 | 31-03-2017 | Fundamentals of Rapid prototyping | | 1 | DM1 |
| 55 | 01-04-2017 | Advantages of Rapid prototyping. | | 1 | DM1 |
| 56 | 03-04-2017 | Classification of Rapid prototyping. | | 1 | DM1 |
| 57 | 05-04-2017 | Rapid prototyping process change. | | 1 | DM1 |
| 58 | *06-04-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| **Unit-V** | | | | | |
| 59 | 07-04-2017 | **LIQUID BASED RAPID PROTYPING**- Introduction | | 1 | DM1 |
| 60 | 08-04-2017 | Stereo lithography apparatus(SLE) | | 1 | DM1 |
| 61 | 10-04-2017 | Solid Ground Curing(SGC) | | 1 | DM1 |
| 62 | 12-04-2017 | SOLID BASED PROTOTYPING- Selective Laser Sintering (SLS) | | 1 | DM1 |
| 63 | *13-04-2017 | TUTORIAL | | 1 | DM2 |
| 64 | 15-04-2017 | EOS' S System | | 1 | DM1 |
| 65 | 17-04-2017 | EOSINT System | | 1 | DM1 |
| 66 | 19-04-2017 | Applications of Rapid prototyping. | | 1 | DM1 |
| 67 | *20-04-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 68 | 21-04-2017 | REVISION | | 1 | DM6 |

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|---|---|---|---|---|---|
| 69 | 22-04-2017 | Advanced topics | | 1 | DM1 |
| 70 | 24-04-2017 | Advanced topics | | 1 | DM1 |
| 71 | 26-04-2017 | Advanced topics | | 1 | DM1 |
| 72 | *27-04-2017 | Advanced topics | | 1 | DM1 |
| 73 | 29-04-2017 | Advanced topics | | | DM1 |
| | | **Total** | | 73 | |
| **Total number of classes required to complete the syllabus** | | | | **70** | |
| **Total number of classes available as per Schedule** | | | | **73** | |

**NOTE: DELIVERY METHODS (DM)**:
**DM1**: Lecture interspersed with discussions/BB
**DM2:** Tutorial
**DM3:** Lecture with a quiz
**DM4**: Assignment/Test
**DM5**: Demonstration (laboratory, field visit)
**DM6:** Presentations/PPT

After the completion of the course, students should be able to,

**CO1**:To provide the students with a proper understanding and use of non traditional method of machining complex, hard & brittle materials .
**CO2**: To provide with a proper understanding of mechanical processes USM, AJM, WJM etc.
**CO3**: To understand the process principles and material removed rate in Electro chemical machining and EDM.
**CO4**: To understand the process principles, & applications of Rapid prototyping.
**CO5**: To understand various techniques of Rapid prototyping.

| **Signature** | | | |
|---|---|---|---|
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Seelam Srinivasa Reddy | Dr.S.Pichi Reddy | Dr.K.Appa Rao |

# LESSON PLAN

**Course Name: S317 - MODERN MACHINING PROCESSES, SEM: 6**
**Programme:** B.Tech **A.Y:2016-17** **Department: MECH-B**

| S No. | Tentative Date | Topics to be covered | Actual Date | No. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **Unit-I** | | | | | |
| 1 | 27-12-2016 | **MODERN MACHINING PROCESS** -Introduction | | 1 | DM1 |
| 2 | 29-12-2016 | Explained need of conventional machining processes | | 1 | DM1 |
| 3 | 30-12-2016 | Classification of conventional machining processes, Types of energies used in Modern machining process. | | 1 | DM1 |
| 4 | *31-12-2016 | TUTORIAL/ASSIGNMENT TEST | | | DM2/DM4 |
| 5 | 02-01-2017 | Considerations in process selection, Explained Comparison between conventional machining and non conventional machining processes. | | 1 | DM1 |
| 6 | 03-01-2017 | Basic principle of ultrasonic machining, equipment setup and procedure | | 1 | DM1 |
| 7 | 05-01-2017 | Process variables, applications and MRR calculations. | | 1 | DM2 |
| 8 | 06-01-2017 | Basic principle of Abrasive jet machining, equipment setup and procedure. | | 1 | DM1 |
| 9 | *07-01-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 10 | 09-01-2017 | Process variables, MRR calculations, Applications and Advantages, | | 1 | DM2 |
| 11 | 10-01-2017 | Water jet machining Basic principle, equipment setup and procedure | | 1 | DM1 |
| 12 | 12-01-2017 | Process variables and applications.MRR calculations. | | 1 | DM2 |
| 13 | 16-01-2017 | REVISION | | 1 | DM6 |
| **Unit-II** | | | | | |
| 14 | 17-01-2017 | **Electrochemical Process** Introduction | | 1 | DM1 |
| 15 | 19-01-2017 | Basic principle of Electrochemical machining, equipment setup and procedure | | 1 | DM1 |
| 16 | 20-01-2017 | Process, applications and MRR calculations. | | 1 | DM1 |
| 17 | *21-01-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 18 | 23-01-2017 | Basic principle of Electrochemical grinding, equipment setup and procedure. | | 1 | DM1 |
| 19 | 24-01-2017 | Process variables, MRR calculations, Applications and Advantages, | | 1 | DM1 |
| 20 | 27-01-2017 | Basic principle of Electrochemical Deburring, equipment setup and | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| | | procedure. | | | |
| 21 | 28-01-2017 | Basic principle of Electrochemical Honing, equipment setup and procedure | | 1 | DM1 |
| 22 | 30-01-2017 | Process material removal rate in electrochemical Honing. | | 1 | DM1 |
| 23 | 31-01-2017 | CHEMICAL MACHINING- introduction-principle- mask ants and etchants. | | 1 | DM1 |
| 24 | 02-02-2017 | Advantages and applications of Chemical machining. | | 1 | DM3 |
| 25 | 03-02-2017 | Electrical Discharge Machining – Introduction, General principle. | | 1 | DM1 |
| 26 | *04-02-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 27 | 06-02-2017 | Applications of EDM. | | 1 | DM1 |
| 28 | 07-02-2017 | Power circuits for Electric Discharge Machining, | | 1 | DM1 |
| 29 | 09-02-2017 | MRR in EDM | | 1 | DM1 |
| 30 | 10-02-2017 | Process parameters, | | 1 | DM1 |
| 31 | *11-02-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 32 | 13-02-2017 | Selection of tool, electrodes and electrical fluids. | | 1 | DM1 |
| 33 | 14-02-2017 | Selection of tool, electrodes and electrical fluids. | | 1 | DM1 |
| 34 | 16-02-2017 | Principle of ED Wire cutting machine. | | 1 | DM1 |
| 35 | 17-02-2017 | Applications of ED wire cutting. | | 1 | DM1 |
| 36 | 18-02-2017 | REVISION | | 1 | DM6 |
| **UNIT-III** | | | | | |
| 37 | 06-03-2017 | **ELECTRON BEAM**- principle . | | 1 | DM1 |
| 38 | 08-03-2017 | Process of EBM | | 1 | DM1 |
| 39 | *09-03-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 40 | 10-03-2017 | Equipment setup of EBM and applications. | | 1 | DM1 |
| 41 | 13-03-2017 | LASER BEAM Machining- principle and Process of LBM | | 1 | DM1 |
| 42 | 15-03-2017 | Equipment and applications of LBM | | 1 | DM1 |
| 43 | 16-03-2017 | PLASMA ARC Machining- principle | | 1 | DM1 |
| 44 | 17-03-2017 | Process of PAM | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 45 | 18-03-2017 | Equipment and applications of PAM | | 1 | DM1 |
| 46 | 20-03-2017 | HOT MACHINING- Introduction. | | 1 | DM1 |
| 47 | 22-03-2017 | Distinguish between PAM and EBM | | 1 | DM1 |
| 48 | *23-03-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 49 | 24-03-2017 | REVISION | | 1 | DM6 |
| **Unit-IV** | | | | | |
| 50 | 25-03-2017 | **RAPID PROTO TYPING**- Introduction,. | | 1 | DM1 |
| 51 | 27-03-2017 | Proto type fundamentals | | 1 | DM1 |
| 52 | 29-03-2017 | Historical developments | | 1 | DM1 |
| 53 | *30-03-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 54 | 31-03-2017 | Fundamentals of Rapid prototyping | | 1 | DM1 |
| 55 | 01-04-2017 | Advantages of Rapid prototyping. | | 1 | DM1 |
| 56 | 03-04-2017 | Classification of Rapid prototyping. | | 1 | DM1 |
| 57 | 05-04-2017 | Rapid prototyping process change. | | 1 | DM1 |
| 58 | *06-04-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| **Unit-V** | | | | | |
| 59 | 07-04-2017 | **LIQUID BASED RAPID PROTYPING**- Introduction | | 1 | DM1 |
| 60 | 08-04-2017 | Stereo lithography apparatus(SLE) | | 1 | DM1 |
| 61 | 10-04-2017 | Solid Ground Curing(SGC) | | 1 | DM1 |
| 62 | 12-04-2017 | SOLID BASED PROTOTYPING- Selective Laser Sintering (SLS) | | 1 | DM1 |
| 63 | *13-04-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2/DM4 |
| 64 | 15-04-2017 | EOS' S System | | 1 | DM1 |
| 65 | 17-04-2017 | EOSINT System | | 1 | DM1 |
| 66 | 19-04-2017 | Applications of Rapid prototyping. | | 1 | DM1 |
| 67 | *20-04-2017 | TUTORIAL/ASSIGNMENT TEST | | 1 | DM2 |
| 68 | 21-04-2017 | REVISION | | 1 | DM6 |

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|---|---|---|---|---|---|
| 69 | 22-04-2017 | Advanced topics | | 1 | DM1 |
| 70 | 24-04-2017 | Advanced topics | | 1 | DM1 |
| 71 | 26-04-2017 | Advanced topics | | 1 | DM1 |
| 72 | *27-04-2017 | Advanced topics | | 1 | DM1 |
| 73 | 29-04-2017 | Advanced topics | | 1 | DM1 |
| | | **Total** | | 73 | |
| **Total number of classes required to complete the syllabus** | | | | **70** | |
| **Total number of classes available as per Schedule** | | | | **73** | |

**NOTE: DELIVERY METHODS (DM)**:
**DM1**: Lecture interspersed with discussions/BB
**DM2:** Tutorial
**DM3:** Lecture with a quiz
**DM4**: Assignment/Test
**DM5**: Demonstration (laboratory, field visit)
**DM6:** Presentations/PPT

After the completion of the course, students should be able to,

**CO1**:To provide the students with a proper understanding and use of non traditional method of machining complex, hard & brittle materials .
**CO2**: To provide with a proper understanding of mechanical processes USM, AJM, WJM etc.
**CO3**: To understand the process principles and material removed rate in Electro chemical machining and EDM.
**CO4**: To understand the process principles, & applications of Rapid prototyping.
**CO5**: To understand various techniques of Rapid prototyping.

| **Signature** | | | |
|---|---|---|---|
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Seelam Srinivasa Reddy | Dr.S.Pichi Reddy | Dr.K.Appa Rao |

| S No. | Tentative Date | Topics to be covered | Actual Date | No. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| Unit-I | | | | | |
| 1 | 2/12/2014 | Introduction given about subject | | 1 | DM1 |
| 2 | 3/12/2014 | Explained need of conventional machining processes | | 1 | DM1 |
| 3 | 4/12/2014 | Classification of conventional machining processes | | 1 | DM1 |
| 4 | 5/12/2014 | Tutorial-1 | | 1 | DM2 |
| 5 | 9/12/2014 | Types of energies used in UMP | | 1 | DM1 |
| 6 | 10/12/2014 | Considerations in process selection | | 1 | DM1 |
| 7 | 11/12/2014 | Explained Comparison between conventional machining And non conventional machining processes | | 1 | DM1 |
| 8 | 12/12/2014 | Tutorial-2 | | 1 | DM2 |
| Unit-II | | | | | |
| 9 | 16/12/2014 | Introduction about mechanical processes | | 1 | DM1 |
| 10 | 17/12/2014 | Classification of mechanical processes | | 1 | DM1 |
| 11 | 18/12/2014 | Basic principle of ultrasonic machining process | | 1 | DM1 |
| 12 | 19/12/2014 | Tutorial-3 | | 1 | DM2 |
| 13 | 22312/2014 | ultrasonic machining process, equipment set up | | 1 | DM1 |
| 14 | 24/12/2014 | procedure, variables | | 1 | DM1 |
| 15 | 26/12/2014 | Capabilities of UMP | | 1 | DM1 |
| 16 | 30/12/2014 | ultrasonic machining applications and MRR calculations | | 1 | DM1 |

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|---|---|---|---|---|---|
| 17 | 31-12-2014 | Tutorial-II | | 1 | DM2 |
| 18 | 2/1/2015 | Basic principle of Abrasive jet machining, | | 1 | DM1 |
| 19 | 6/1/2015 | Abrasive jet machining equipment set up and | | 1 | DM1 |
| 20 | 7/1/2015 | procedure | | 1 | DM1 |
| 21 | 8/1/2015 | process variables | | 1 | DM1 |
| 22 | 9/1/2015 | Applications | | 1 | DM1 |
| 23 | 9/1/2015 | Abrasive jet machining applications and MRR calculations | | 1 | DM2 |
| 24 | 20/01/2015 | Tutorial-III | | 1 | DM1 |
| 25 | 21/1/2015 | Water jet machining equipment set up, Basic principle, process procedure | | 1 | DM1 |
| 26 | 22/1/2015 | Water jet machining process variables | | 1 | DM2 |
| 27 | 23/1/2015 | Water jet machining applications | | 1 | DM1 |
| 28 | 27/1/2015 | Tutorial-III | | 1 | DM3 |
| Unit-III | | | | | |
| 29 | 30/1/2015 | Introduction about Electrochemical Processes | | 1 | DM1 |
| 30 | 3/2/2015 | Classification in Electrochemical Processes principles, equipment electrochemical machining Process material removal rate in electrochemical machining | | 1 | DM1 |
| 31 | 4/2/2015 | principles, equipment electrochemical grinding Process material removal rate in electrochemical grinding | | 1 | DM1 |
| 32 | 5/2/2015 | principles, equipment electrochemical deburring | | 1 | DM1 |
| 33 | 6/2/2015 | Process material removal rate in electrochemical deburring | | 1 | DM1 |
| 34 | 10/2/2015 | Tutorial-IV | | 1 | DM2 |
| 35 | 11/2/2015 | Chemical machining-principle- mask ants etchants | | 1 | DM1 |
| 36 | 12/2/2015 | Electro chemical deburringadvantages and applications. | | 1 | DM1 |
| 37 | 13/2/2015 | Comparison advantages and applications of all Electrochemical Processes | | 1 | DM3 |
| Unit-IV | | | | | |
| 38 | 18/2/2015 | Introduction Electrical Discharge Machining | | 1 | DM1 |

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|---|---|---|---|---|---|
| 39 | 19/2/2015 | Principle Electrical Discharge Machining | | 1 | DM1 |
| 40 | 20/2/2015 | Applications of Electric Discharge Machining | | 1 | DM1 |
| 41 | 224/2/2015 | Process set up of Electric Discharge Machining | | 1 | DM1 |
| 42 | 25/2/2015 | Power circuits Electric Discharge Machining | | 1 | DM1 |
| 43 | 26/2/2015 | Mechanics of metal removal in Electric Discharge Machining | | 1 | DM1 |
| 44 | 27/2/2015 | Tutorial-V | | 1 | DM2 |
| 45 | 3/3/2015 | Process parameters in Electric Discharge Machining | | 1 | DM1 |
| 46 | 4/3/2015 | Detailed discussion of each parameter in Electric Discharge Machining | | 1 | DM1 |
| 47 | 6/3/2015 | selection of tool electrode Electric Discharge Machining | | 1 | DM1 |
| 48 | 7/3/2015 | selection of tool procedure Electric Discharge Machining | | 1 | DM1 |
| 49 | 10/3/2015 | Electric Discharge Machining dielectric fluids. | | 1 | DM1 |
| 50 | 11/3/2015 | Electric discharge wire cutting, procedure examples | | 1 | DM1 |
| 51 | 12/3/2015 | Electric Discharge Machining principle and applications. | | 1 | DM1 |
| 52 | 13/3/2015 | Tutorial-VI | | 1 | DM3 |
| Unit-V | | | | | |
| 53 | 17/3/2015 | Introduction Electron Beam machining | | 1 | DM1 |
| 54 | 18/3/2015 | Principle , Process of Electron Beam machining | | 1 | DM1 |
| 55 | 19/3/2015 | Equipment of Electron Beam machining | | 1 | DM1 |
| 56 | 20/3/2015 | Applications of electron beam machining | | 1 | DM1 |
| 57 | 24/3/2015 | Principle and Process of Laser Beam machining | | 1 | DM1 |
| 58 | 25/3/2015 | Equipment of Laser Beam machining Applications of Laser Beam machining | | 1 | DM1 |
| 59 | 26/3/2015 | Principle and process of Plasma Arc Machining Equipment of Plasma Arc Machining | | 1 | DM2 |
| 60 | 27/3/2015 | Applications of Plasma Arc Machining | | 1 | DM1 |
| 61 | 31/4/2015 | Comparison of electron, laser,plasma arc machining processes | | 1 | DM1 |
| | | **Total** | | 61 | |
| **Total number of classes required to complete the syllabus** | | | | **61** | |
| **Total number of classes available as per Schedule** | | | | **61** | |

**NOTE: DELIVERY METHODS (DM)**:

**DM1**: Lecture interspersed with discussions/BB
**DM2:** Tutorial
**DM3:** Lecture with a quiz
**DM4**: Assignment/Test
**DM5**: Demonstration (laboratory, field visit)
**DM6:** Presentations/PPT

After the completion of the course, students should be able to,

**CO1**:To provide the students with a proper understanding and use of non traditional method of machining complex, hard & brittle materials .
**CO2**: To provide with a proper understanding of mechanical processes USM, AJM, WJM etc.
**CO3**: To understand the process principles and material removed rate in Electro chemical machining.
**CO4**: To understand the process principles, & applications of electrical discharge machining..
**CO5**: To expose on most relevant industrial solutions and the applications of EBM,LBM and PAM..

**TEXT BOOK**

1. Modern Machining Process / Pandey P.C. and Shah H.S./ TMH.

**REFERENCE:**

1. Unconventional manufacturing processes/ M.K.Singh/ New age international
2. Advanced machining processes/ VK Jain/ Allied publishers

| **Signature** | | | |
|---|---|---|---|
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Seelam Srinivasa Reddy | Dr.S.Pichi Reddy | Dr.K.Appa Rao |

**LESSON PLAN**

**Course Name:** Mechanical Vibration **SEM:** VI

**Programme:** B.Tech **Department:** ME

| S No. | Tentative Date | Topics to be covered | Actual Date | Num. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| | | **UNIT-I**: | | | |
| 1. | 29-12-2016 | Introduction to Vibrations | | 1 | DM1 |
| 2. | 30-12-2016 | Different types of vibrations | | 1 | DM1 |
| 3. | 31-12-2016 | Mathematical back ground | | 1 | DM1 |
| 4. | 03-01-2017 | Mathematical back ground | | 1 | DM1 |
| 5. | 04-01-2017 | D' Alemberts principle | | 1 | DM1 |
| 6. | 05-01-2017 | Definitions equation and solutions | | 1 | DM1 |
| 7. | 06-01-2017 | Problems in Natural vibrations | | 1 | DM1 |
| 8. | 07-01-2017 | Problems in Natural vibrations | | 1 | DM1 |
| 9. | 10-01-2017 | Equivalent spring stiffness | | 1 | DM1 |
| 10. | 11-01-2017 | Energy method and problems | | 1 | DM1 |
| 11. | 12-01-2017 | Problems and tutorials | | 1 | DM1 |
| 12. | 17-01-2017 | Tutorials Home work problems | | 1 | DM2 |
| | | **UNIT-II:** | | | |
| 13. | 18-01-2017 | Damped free vibrations – types of damping | | 1 | DM1 |
| 14. | 19-01-2017 | Viscous damping – differential equations | | 1 | DM1 |
| 15. | 20-01-2017 | Solution of differential equation | | 1 | DM1 |
| 16. | 21-01-2017 | OD,CD & under damped systems | | 1 | DM1 |
| 17. | 24-01-2017 | Analysis of under damped systems | | 1 | DM1 |
| 18. | 25-01-2017 | Log decrement – problems | | 1 | DM1 |
| 19. | 27-01-2017 | Problems in damped vibrations | | 1 | DM1 |
| 20. | 28-01-2017 | Problems in damped vibrations | | 1 | DM1 |
| 21. | 31-01-2017 | Viscous damped – types, coulomb damping | | 1 | DM1 |
| 22. | 01-02-2017 | Tutorials | | 1 | DM2 |
| 23. | 02-02-2017 | **Tutorials, Home work problems** | | 1 | DM2 |
| | | **UNIT-III** | | | |
| 24. | 03-02-2017 | Introduction to forced vibrations | | 1 | DM1 |
| 25. | 04-02-2017 | Hormonic excitations | | 1 | DM1 |
| 26. | 07-02-2017 | Steady state vibrations-equations | | 1 | DM1 |
| 27. | 08-02-2017 | Unbalanced rotating and reciprocating masses | | 1 | DM1 |
| 28. | 09-02-2017 | Unbalanced forces – problems | | 1 | DM1 |
| 29. | 10-02-2017 | Problems in forced vibrations | | 1 | DM1 |
| 30. | 11-02-2017 | Problems in forced vibrations | | 1 | DM1 |
| 31. | 14-02-2017 | Base excitation – concept | | 1 | DM1 |
| 32. | 15-02-2017 | Applications of base excitations | | 1 | DM1 |
| 33. | 16-02-2017 | Vibration ISO fation and transmissibility | | 1 | DM1 |
| 34. | 17-02-2017 | Problems in base excitation and | | 1 | DM1 |

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|---|---|---|---|---|---|
| | | vibration iso tation | | | |
| 35. | 18-02-2017 | Types of vibration ISOfators | | 1 | DM1 |
| 36. | 28-02-2017 | Measurement of vibrations | | 1 | DM1 |
| 37. | 01-03-2017 | Tutorials | | 1 | DM2 |
| 38. | 02-03-2017 | Tutorials, Home work problems | | 1 | DM2 |
| 39. | 03-03-2017 | Introduction to 2 degrees of freedom | | 1 | DM1 |
| 40. | 04-03-2017 | Cases of two degrees of freedom. | | 1 | DM1 |
| 41. | 07-03-2017 | Problems in 2 degrees of freedom | | 1 | DM1 |
| 42. | 08-03-2017 | Problems in 2 degrees of freedom | | 1 | DM1 |
| 43. | 09-03-2017 | Problems in 2 degrees of freedom | | 1 | DM1 |
| 44. | 10-03-2017 | Problems in 2 degrees of freedom | | 1 | DM1 |
| | | **UNIT-IV** | | | |
| 45. | 11-03-2017 | Torsional systems – Analysis | | 1 | DM1 |
| 46. | 14-03-2017 | Forced (undamped) Vibrations with Harimonic excitation | | 1 | DM1 |
| 47. | 15-03-2017 | Undamped dynamic vibration absotor | | 1 | DM1 |
| 48. | 16-03-2017 | Problems in scnoch apsorber | | 1 | DM1 |
| 49. | 17-03-2017 | Tutorials | | 1 | DM2 |
| 50. | 18-03-2017 | Tutorial, Home work problems | | 1 | DM2 |
| 51. | 21-03-2017 | Several degres of freedom systems | | 1 | DM1 |
| 52. | 22-03-2017 | Exact analysis, free vibrations | | 1 | DM1 |
| 53 | 23-03-2017 | Influence coefficients – problems | | 1 | DM1 |
| | | **UNIT-V:** | | | |
| 54 | 24-03-2017 | Maxwell reciprocal theorem and applications | | 1 | DM1 |
| 55 | 25-03-2017 | Problems in Maxwell reciprocal applications | | 1 | DM2 |
| 56 | 29-03-2017 | Tersional systems- multirotor suytems | | 1 | DM1 |
| 57 | 30-03-2017 | Problems in three-rotor systems | | 1 | DM1 |
| 58 | 31-03-2017 | Geared systems & Problems | | 1 | DM1 |
| 59 | 01-04-2017 | Raylasits method- concept | | 1 | DM1 |
| 60 | 04-04-2017 | Problems-Raylighs method | | 1 | DM1 |
| 61 | 05-04-2017 | Tutorials | | 1 | DM2 |
| 62 | 06-04-2017 | Tutorial, Home work problems | | 1 | DM2 |
| 63 | 07-04-2017 | Revision | | 1 | DM1 |
| 64 | 08-04-2017 | Revision | | 1 | DM1 |
| 65 | 11-04-2017 | Revision | | 1 | DM1 |
| 66 | 12-04-2017 | Revision | | 1 | DM1 |
| 67 | 13-04-2017 | Introduction to Advanced topics | | 1 | DM1 |
| 68 | 15-04-2017 | Introduction to Advanced topics | | 1 | DM1 |
| 69 | 18-04-2017 | Beyond syllabus | | 1 | DM1 |
| 70 | 19-04-2017 | Revision | | 1 | DM1 |
| 71 | 20-04-2017 | Revision | | 1 | DM1 |

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|---|---|---|---|---|---|
| 72 | 21-04-2017 | Revision | | 1 | DM1 |
| 73 | 22-04-2017 | Revision | | 1 | DM2 |
| 74 | 25-04-2017 | Revision | | 1 | |
| 75 | 26-04-2017 | Revision | | 1 | |
| 76 | 27-04-2017 | Revision | | 11 | |
| | | | **Total** | 76 | |
| **Total number of classes required to complete the syllabus** | | | | | **68** |
| **Total number of classes available as per Schedule** | | | | | **76** |

**NOTE: DELIVERY METHODS** : **DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial, **DM3:** Lecture with a quiz, **DM4**: Assignment/Test, **DM5**: Demonstration ( laboratory, field visit ), **DM6:** Presentations/PPT

At the End of the course, students attained the **Course Outcomes:CO1,CO2,CO3,CO4,CO5** & sample proofs are enclosed in Course file.

| | | | |
|---|---|---|---|
| **Signature** | | | |
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Prof. P.Bhupal Reddy | Dr.P.V.Chandra Sekhar Rao | Dr.K.Appa Rao |

**LESSON PLAN**

**Course Name: S414 – TRIBOLOGY** **Programme: B.Tech**
**SEM: VI** **A.Y:2016-17** **Department: Mechanical Engineering**

| S No. | Tentative Date | Topics to be covered | Actual Date | No. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I: INTRODUCTION TO TRIBOLOGY, FRICTION & WEAR** | | | | | |
| 1 | 29-12-2016 | Introduction | | 1 | DM1 |
| 2 | 30-12-2016 | Tribology and their characteristic feature | | 1 | DM1 |
| 3 | 31-12-2016 | Analysis and assessment of surface, Topography Types of friction | | 1 | DM1 |
| 4 | 03-01-2017 | Adhesion Theory friction | | 1 | DM1 |
| 5 | 04-01-2017 | Asperity Interlocking Theory of friction | | 1 | DM1 |
| 6 | 05-01-2017 | Molecular Attraction Theory, Stick-Slip Theory | | 1 | DM1 |
| 7 | 06-01-2017 | boundary friction and Film friction | | 1 | DM1 |
| 8 | 07-01-2017 | friction reducing measures | | 1 | DM1 |
| 9 | 10-01-2017 | Friction Measurement | | 1 | DM1 |
| 10 | 11-01-2017 | Causes of wear, effects of Wear Types of wear | | 1 | DM1 |
| 11 | 12-01-2017 | Adhesive Wear Mechanism | | 1 | DM1 |
| 12 | 17-01-2017 | Abrasive Wear Mechanism | | 1 | DM1 |
| 13 | 18-01-2017 | Erosion & Corrosion Wear Mechanisms | | 1 | DM1 |
| 14 | 19-01-2017 | Fretting & Fatigue Wear Mechanisms | | 1 | DM1 |
| 15 | 20-01-2017 | Laws of Wear | | 1 | DM1 |
| 16 | 21-01-2017 | Wear Measurement | | 1 | DM1 |
| 17 | 24-01-2017 | Review of Unit-I (PPT) | | 1 | DM6 |
| 18 | 25-01-2017 | Tutorial-I | | 1 | DM2 |
| 19 | 27-01-2017 | Tutorial-II | | 1 | DM2 |
| 20 | 28-01-2017 | Slip Test-I & Assignment -I | | 1 | DM4 |
| **UNIT-II: VISCOSITY AND LUBRICANTS** | | | | | |
| 21 | 31-01-2017 | Viscosity Introduction Absolute and Kinematic Viscosity | | 1 | DM1 |
| 22 | 01-02-2017 | Flow of fluids- Bingham Plastics, Pseudo Plastics, Dilatants | | 1 | DM1 |
| 23 | 02-02-2017 | Thexotropic & Rheoptic flows | | 1 | DM1 |
| 24 | 03-02-2017 | Viscosity & it's Variation, Factors effecting viscosity | | 1 | DM1 |
| 25 | 04-02-2017 | Temperature variation, Viscosity Index, Viscosity Standards. | | 1 | DM1 |
| 26 | 07-02-2017 | Redwood Viscometer | | 1 | DM5 |
| 27 | 08-02-2017 | Engler's & Saybolt Viscometer | | 1 | DM5 |
| 28 | 09-02-2017 | Lubricants and their physical properties | | 1 | DM1 |
| 29 | 10-02-2017 | Boundary Lubrication | | 1 | DM1 |
| 30 | 11-02-2017 | Hydro Dynamic Lubrication, Tower's Experiment | | 1 | DM1 |

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|---|---|---|---|---|---|
| 31 | 14-02-2017 | Hydrostatic Lubrication | | 1 | DM1 |
| 32 | 15-02-2017 | Review of Unit-II (PPT) | | 1 | DM6 |
| 33 | 16-02-2017 | Tutorial-III | | 1 | DM2 |
| 34 | 17-02-2017 | Slip Test-II & Assignment -II | | 1 | DM4 |
| 35 | 18-02-2017 | Revision | | 1 | DM1 |
| | 20-02-2017 To 27-02-2017 | **I Mid Examinations** | | | |
| **UNIT-III: THEORY OF HYDRODYNAMIC LUBRICATION** | | | | | |
| 36 | 28-02-2017 | Petroffs equation, | | 1 | DM1 |
| 37 | 01-03-2017 | Reynolds's equation in two dimensions | | 1 | DM1 |
| 38 | 02-03-2017 | bearing modulus, Somerfield number, Effects of side leakage | | 1 | DM1 |
| 39 | 03-03-2017 | minimum oil film thickness, Clearance, Eccentricity | | 1 | DM1 |
| 40 | 04-03-2017 | pressure, flow, load capacity | | 1 | DM1 |
| 41 | 07-03-2017 | Journal Bearing Design based on various dimensionless variables | | 1 | DM1 |
| 42 | 08-03-2017 | friction calculations | | 1 | DM1 |
| 43 | 09-03-2017 | heat balance | | 1 | DM1 |
| 44 | 10-03-2017 | Design of Journal Bearings | | 1 | DM1 |
| 45 | 11-03-2017 | oil whip and whirl | | 1 | DM1 |
| 46 | 14-03-2017 | Review of Unit-III (PPT) | | 1 | DM6 |
| 47 | 15-03-2017 | Tutorial-IV | | 1 | DM2 |
| 48 | 16-03-2017 | Tutorial-V | | 1 | DM2 |
| 49 | 17-03-2017 | Slip Test-III & Assignment -III | | 1 | DM4 |
| **UNIT-IV: THEORY OF HYDROSTATIC LUBRICATION** | | | | | |
| 50 | 18-03-2017 | Hydrostatic step bearing, | | 1 | DM1 |
| 51 | 21-03-2017 | pivoted pad thrust bearing | | 1 | DM1 |
| 52 | 22-03-2017 | hydrostatic lifts, hydrostatic squeeze films | | 1 | DM1 |
| 53 | 23-03-2017 | pressure, flow, load capacity | | 1 | DM1 |
| 54 | 24-03-2017 | friction calculations | | 1 | DM1 |
| 55 | 25-03-2017 | oil rings | | 1 | DM1 |
| 56 | 29-03-2017 | pressure feed bearing partial bearings | | 1 | DM1 |
| 57 | 30-03-2017 | externally pressurized bearings | | 1 | DM1 |
| 58 | 31-03-2017 | Air lubricated bearing | | 1 | DM1 |
| 59 | 01-04-2017 | Advantages and disadvantages of air lubricated bearings | | 1 | DM1 |
| 60 | 04-04-2017 | Review of Unit-IV (PPT) | | 1 | DM6 |
| 61 | 05-04-2017 | Tutorial-VI | | 1 | DM2 |
| 62 | 06-04-2017 | Slip Test-IV & Assignment -IV | | 1 | DM4 |
| **UNIT-V: ANTI-FRICTION BEARINGS AND BEARING MATERIALS** | | | | | |
| 63 | 07-04-2017 | Introduction to Anti-friction bearings, | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 64 | 08-04-2017 | Types of Antifriction Bearings | | 1 | DM1 |
| 65 | 11-04-2017 | Advantages and disadvantages of Rolling Contact Bearings | | 1 | DM1 |
| 66 | 12-04-2017 | General requirements of bearing materials | | 1 | DM1 |
| 67 | 13-04-2017 | types of bearing materials | | 1 | DM1 |
| 68 | 15-04-2017 | Designation of Rolling contact bearings | | 1 | DM1 |
| 69 | 18-04-2017 | General bearing design considerations | | 1 | DM1 |
| 70 | 19-04-2017 | Design of rolling contact bearings | | 1 | DM1 |
| 71 | 20-04-2017 | Review of Unit-III (PPT) | | 1 | DM6 |
| 72 | 21-04-2017 | Tutorial-VII | | 1 | DM2 |
| 73 | 22-04-2017 | Slip Test-V & Assignment -V | | 1 | DM4 |
| 74 | 25-04-2017 | Beyond syllabus | | 1 | DM1 |
| 75 | 26-04-2017 | Beyond syllabus | | 1 | DM1 |
| 76 | 27-04-2017 | Revision | | 1 | DM1 |
| 77 | 28-04-2017 | Revision | | 1 | DM1 |
| 78 | 29-04-2017 | Revision | | 1 | DM1 |
| | 03-11-2016 to 05-11-2016 | **II Mid Examinations** | | | |
| **Total** | | | | **78** | |
| **Total number of classes required to complete the syllabus** | | | | **58** | |
| **Total number of classes available as per Schedule** | | | | **78** | |

**NOTE: DELIVERY METHODS (DM)**:
**DM1**: Lecture interspersed with discussions/BB
**DM2:** Tutorial
**DM3:** Lecture with a Quiz
**DM3/DM4**: Assignment/Test
**DM5**: Demonstration (laboratory, field visit)
**DM6:** Presentations/PPT

**Course Educational Objectives:**

The main objectives of the course are:

1. To learn the basic concepts of Tribology and its significance
2. To understand the nature of engineering surfaces, their topography and learn about surface characterization techniques
3. To understand the principle of lubrication, theories of hydrodynamic and mixed boundary lubrication.
4. To learn about consequences of wear, wear mechanisms, wear theories and analysis of wear problems
5. To understand the principles of bearing selection, its arrangement in machines

**Course Outcomes:**

After completion of the course students are able to:

1. Apply the concepts of principles of Tribology with particular emphasis on lubricated systems.
2. Analyze the various design parameters of bearings under different loads, temperature conditions.
3. Calculate the wear percentage by using different wear theories

4. Identify the wear mechanisms on rubbing surfaces.
5. Design the various types of antifriction bearings, and general requirements of bearing materials.

**TEXT BOOK**

1. Basu S.K, SenGupta and Ahuja, Fundamentals of Tribology, PHI Learning Private Limited, 2009.
2. Gwidon W Stachowiak and Andrew W Batchlor, Engineering Tribology, 3rd Edition, Elsevier

| | Course Instructor | Course Coordinator | Module Coordinator | Programme Coordinator | HoD |
|---|---|---|---|---|---|
| **Signature** | | | | | |
| **Name** | **K.V.Viswanadh** | **B. Sudheer Kumar** | **B. Sudheer Kumar** | **Dr.S.Pichi Reddy** | **Dr.K.Apparao** |

**LESSON PLAN**

**Course Code& Course Name:** S141-Automobile Engineering

**Programme: III** B.Tech **Department:** MECHANICAL

**SEM: VI(B/s)** **A.Y: 2016-2017**

| S.No | Tentative Date | Topics to be covered | Actual Date | No of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I: INTRODUCTION, ENGINE CONSTRUCTION** | | | | | |
| 1) | 29-12-16 | Introduction, Components of an Automobile-I | | 1 | DM1,DM6 |
| 2) | 30-12-16 | Components of an Automobile-II | | 1 | DM1 |
| 3) | 31-12-16 | Rear wheel drive, front wheel drive and four wheel drive | | 1 | DM1 |
| 4) | 02-01-17 | Differences between Rear wheel drive and Front wheel drive, Four wheel drive | | 1 | DM6 |
| 5) | 02-01-17 | Frame-Types, Specifications of Automobiles, Types of Automobiles | | 1 | DM1 |
| 6) | 05-01-17 | Working of Internal Combustion engines, Comparision of SI and CI Engines | | 1 | DM1 |
| 7) | 06-01-17 | Comparision of Four-stroke and Two-stroke Engines | | 1 | DM1 |
| 8) | 07-01-17 | Tutorial-I | | 1 | DM2 |
| 9) | 09-01-17 | Cylinder block, Cylinder head, Crank case, Gaskets | | 1 | DM1 |
| 10) | 09-01-17 | Manifolds, Oil-sump, Piston Construction, Piston clearance | | 1 | DM1 |
| 11) | 12-01-17 | Materials for Head, Block & Piston- Advantages & Dis-advantages | | 1 | DM1,DM6 |
| 12) | 19-01-17 | Expansion control in Pistons | | 1 | DM1 |
| 13) | 20-01-17 | Connecting Rod, Crank shaft, Cam-shaft, Flywheel | | 1 | DM6 |
| 14) | 21-01-17 | Valve Construction, Straight poppet valve mechanism | | 1 | DM6 |
| 15) | 23-01-17 | Overhead poppet valve mechanism, Valve tappet Clearance | | 1 | DM1 |
| 16) | 23-01-17 | Supercharging and Turbo-charging | | 1 | DM1 |
| 17) | 27-01-17 | Tutorial-II | | 1 | DM2 |
| **UNIT-II:FUEL SUPPLY SYSTEMS IN PETROL AND DIESEL ENGINES** | | | | | |
| 18) | 28-01-17 | Fuel feed system in petrol engines-Types | | 1 | DM1 |
| 19) | 30-01-17 | Air-fuel mixtures, Mixture requirements at different loads and speeds | | 1 | DM1 |
| 20) | 30-01-17 | Carburetion, Principle of carburetion, Simple Carburettor | | 1 | DM6 |
| 21) | 02-02-17 | Difficulties encountered by simple Carburettor | | 1 | DM6 |

| | | | | | |
|---|---|---|---|---|---|
| 22) | 03-02-17 | Zenith and SU type Carburettor | | 1 | DM1 |
| 23) | 04-02-17 | Fuel pumps ( Mechanical and Electrical pumps) | | 1 | DM1 |
| 24) | 06-02-17 | Tutorial-III | | | DM2 |
| 25) | 06-02-17 | Petrol Injection-Introduction | | 1 | DM1 |
| 26) | 09-02-17 | Types of Petrol Injection, Advantages & Disadvantages | | 1 | DM6 |
| 27) | 10-02-17 | Fuel feed system in diesel engine-Requirements | | 1 | DM6 |
| 28) | 13-02-17 | Methods of Diesel Injection system | | 1 | DM1 |
| 29) | 13-02-17 | Nozzle,Types of Nozzles and Spray formation | | 1 | DM1 |
| 30) | 16-02-17 | Fuel Injector and Tutorial-IV | | 1 | DM1,DM2 |
| 31) | 17-02-17 | Air-cleaners in Petrol and Diesel engines and Fuel guages | | 1 | DM1 |
| 32) | 18-02-17 | Fuel filters Petrol and Diesel engines | | 1 | DM3 |
| **20-02-17 to 27-02-17** | | **I-MID EXAMINATIONS** | | | |
| **UNIT-III: IGNITION SYSTEM, ELECTRONICS SYSTEM** | | | | | |
| 33) | 02-03-17 | Requirements of Ignition system,Battery Ignition system | | 1 | DM1 |
| 34) | 03-03-17 | Components of Battery Ignition system | | 1 | DM1 |
| 35) | 04-03-17 | Electronics Ignition system | | 1 | DM6 |
| 36) | 06-03-17 | Magneto Ignition system, Spark Plug Defects | | 1 | DM1 |
| 37) | 06-03-17 | Tutorial-V | | 1 | DM2 |
| 38) | 09-03-17 | Sensors- Electromagnetic Sensors | | 1 | DM1 |
| 39) | 10-03-17 | Combustion knock Sensors & Variable resistance Sensors | | 1 | DM6 |
| 40) | 13-03-17 | Temperature Sensors | | 1 | DM1 |
| 41) | 13-03-17 | Manifold absolute pressure Sensors & Exhaust gas oxygen Sensors | | 1 | DM1 |
| 42) | 16-03-17 | Air-Flow Measurement | | 1 | DM3 |
| 43) | 17-03-17 | Traction control and stability control | | 1 | DM1 |
| 44) | 18-03-17 | Tutorial-VI | | 1 | DM2 |
| **UNIT-IV:ELECTRICAL SYSTEM, TRANSMISSION SYSTEM** | | | | | |
| 45) | 20-03-17 | Starting system-Starter motor | | 1 | DM1 |
| 46) | 20-03-17 | Bendix drive mechanism,solenoid switch | | 1 | DM1 |
| 47) | 23-03-17 | Lighting system,Horn and wiper | | 1 | DM6 |
| 48) | 24-03-17 | Clutches-Requirements of clutches,principle of `Clutch | | 1 | DM1 |
| 49) | 25-03-17 | cone clutch and Problems | | 1 | DM6 |
| 50) | 27-03-17 | Single plate clutch,Multi plate clutch | | 1 | DM6 |
| 51) | 27-03-17 | Tutorial-VII | | 1 | DM2 |

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|---|---|---|---|---|---|
| 52) | 30-01-17 | Centrifugal clutches | | 1 | DM6 |
| 53) | 31-01-17 | Transmission-Functions of transmission and Various Resistances | | 1 | DM1 |
| 54) | 01-04-17 | Sliding mesh Gear box,Constant mesh gear box | | 1 | DM6 |
| 55) | 03-04-17 | Synchromesh gear box | | 1 | DM6 |
| 56) | 03-04-17 | Automatic transmission-Fluid-Flywheel, Torque convertor | | 1 | DM6 |
| 57) | 06-04-17 | Propeller shaft,Universal joint | | 1 | DM1 |
| 58) | 07-04-17 | HotchKiss drive, Differential | | 1 | DM6 |
| 59) | 10-04-17 | Tutorial-VIII | | 1 | DM2 |
| **UNIT-V: STEERING SYSTEM, SUSPENSION SYSTEM, BRAKING SYSTEM** | | | | | |
| 60) | 13-04-17 | Front axle-Types,Steering geometry-I | | 1 | DM1 |
| 61) | 15-04-17 | Steering geometry-II | | 1 | DM6 |
| 62) | 17-04-17 | Correct steering angle- Davis steering gear mechanism | | 1 | DM1 |
| 63) | 17-04-17 | Types of Steering gears | | 1 | DM1 |
| 64) | 17-04-17 | Power steering and Tutorial-IX | | 1 | DM6, DM2 |
| 65) | 20-04-17 | Suspension system-Leaf springs,Coil springs | | 1 | DM6 |
| 66) | 21-04-17 | Torsion bar,shock absorbers | | 1 | DM1 |
| 67) | 22-04-17 | Independent Suspension systems | | 1 | DM1 |
| 68) | 24-04-17 | Air suspension | | 1 | DM6 |
| 69) | 24-04-17 | Braking system-Requirements,Drum brakes | | 1 | DM1 |
| 70) | 27-04-17 | Disc brakes and Tutorial-X | | 1 | DM1, DM2 |
| 71) | 28-04-17 | Hydraulic braking system circuit & Master cylinder | | 1 | DM6 |
| 72) | 29-04-17 | Air braking system and Anti-lock Braking system | | 1 | DM6 |
| **01-05-17 to 06-05-17** | | **II-MID EXAMINATION** | | | |
| **08-05-17 to 13-05-17** | | **PREPARATION AND PRACTICALS** | | | |
| **15-05-17 to 27-05-17** | | **SEMESTER END EXAMINATIONS** | | | |
| | | **Total** | | 72 | |
| **Total number of classes required to complete the syllabus** | | | | | **60** |
| **Total number of classes available as per Schedule** | | | | | **72** |

| | LESSON PLAN |
|---|---|
| | **Course Code& Course Name:** S141-Automobile Engineering |
| | **Programme: III** B.Tech **Department:** MECHANICAL |
| | **SEM: VI(B/s)** **A.Y: 2016-2017** |

**NOTE: DELIVERY METHODS (DM)**:
**DM1**: Lecture interspersed with discussions/BB
**DM2:** Tutorial
**DM3:** Lecture with a Quiz
**DM4**: Assignment/Test
**DM5**: Demonstration (laboratory, field visit)
**DM6:** Presentations/PPT

| | | | | | |
|---|---|---|---|---|---|
| Signature | | | | | |
| | Course Instructor | Course Coordinator | Module Coordinator | Programme Coordinator | Head of the Department |
| | A.Naresh Kumar | A.Naresh Kumar | P. Vijay Kumar | Dr S.Pitchi Reddy | Dr K.Appa Rao |

| | | | | | |
|---|---|---|---|---|---|
| | **LakireddyBalireddy College of Engineering College**<br>L.B.Reddy Nagar, Mylavaram , Krishna District, A.P<br>**FRESHMAN ENGINEERING DEPARTMENT** | | | | |
| | **LESSON PLAN** | | | | |
| | Subject **:** | **ECPS- L119** | | | |
| | Academic Year : | **2016-17** | Semester : | **VI** | |
| | Year : | **III** | Section : | **Mech-B** | |

**Course Educational Objectives**

In this course, the students will learn to

- Gather information and to organize ideas relevantly and coherently.
- Participate in group discussions, Debates and Face interviews.
- Write project/research reports/technical reports/ formal letters.
- Make oral presentations.
- Transfer information from non-verbal to verbal texts and vice versa.

**Course Outcomes**

After the completion of this course, prospective engineers will have the ability to

- Make power point presentations and oral presentations.
- Articulate English with good pronunciation.
- Face competitive exams like GRE, TOEFL, IELTS etc.
- Face interviews and skillfully manage through group discussions
- Negotiate skillfully for better placement.

**Syllabus:**

- Vocabulary building – synonyms and antonyms, one-word substitutes, analogy, idioms and phrases, verbal & alphabet series.
- Oral Presentations – JAM
- Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Making power point presentations.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, practicing mock-interviews.
- Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, and critical reading.

**Minimum Requirement:**

**The English Language Lab shall have two parts:**

i. **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
ii. **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

**System Requirement (Hardware component):**

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i. P – IV Processor
    1. Speed – 2.8 GHZ
    2. RAM – 512 MB Minimum
    3. Hard Disk – 80 GB
ii. Headphones of High quality

**Suggested Software:**

1.Globarena's software 2. Young India's Clarity software

**Books Recommended:**


1. Stephen Bailey , "Academic Writing- A Practical guide for students", Rontledge Falmer, London & New York, 2004.
2. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, "English Language Communication : A Reader cum Lab Manual, Anuradha Publications, Chennai
3. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi.
4. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup
5. IELTS series with CDs by Cambridge University Press.

| S.No | Teaching Learning Process (TLP) | Delivery Methods (DM) | Assessment Methods (AM) |
|---|---|---|---|
| 1 | Solving Real world problem | Chalk & Talk | Assignments |
| 2 | Explaining application before theory | ICT tools | Quiz |
| 3 | Solving problems | Group discussions | Tutorials |
| 4 | Designing of experiments | Industrial visit | Surprise Tests |
| 5 | Problems on environmental, economics, health & safety | Field work | Mid Exams |
| 6 | Problems on professional & ethics | Case studies | Model Exam |
| 7 | Seminar | Mini Projects | END Exams |
| 8 | Problems using software | Numerical treatment | |
| 9 | Self study | Design / Exercises | |

| S. No. | No. of Lecture Hours | Tentative Dates | Topics | Actual Dates | TLP | DM | AM |
|---|---|---|---|---|---|---|---|
| 1 | 3+3 | 15-07-2016& 20-07-2016 | General Introduction | 15-07-2016& 20-07-2016 | 1 | 1 | |
| 2 | 3+3 | 22-07-2016& 27-07-2016 | JAM/ Synonyms | 22-07-2016& 27-07-2016 | 4,9 | 2,6 | 2,4 |
| 3 | 3+3 | 29-07-2016& 03-08-2016 | JAM/ Synonyms | 29-07-2016& 03-08-2016 | 4,9 | 2,6 | 2,4 |
| 4 | 3+3 | 05-08-2016& 10-08-2016 | Role play/Antonyms | 05-08-2016& 10-08-2016 | 4,9 | 9 | 2,4 |
| 5 | 3+3 | 17-08-2016& 19-07-2016 | Role play/ Antonyms | 17-08-2016& 19-07-2016 | 4,9 | 9 | 2,4 |
| 6 | 3+3 | 24-07-2016& 26-07-2016 | Role play/ Antonyms | 24-07-2016& 26-07-2016 | 7,9 | 2 | 2,4 |
| 7 | 3+3 | 31-08-2016& 02-09-2016 | Group Discussions/Analogy & Idioms | 31-08-2016& 02-09-2016 | 7,9 | 2 | 2,4 |
| 8 | 3+3 | 07-09-2016& 09-09-2016 | Group Discussions/ Analogy & Idioms | 07-09-2016& 09-09-2016 | 7,9 | 2 | 2,4 |
| 9 | 3+3 | 13-09-2016& 16-09-2016 | Group Discussions/ Analogy & Idioms | 13-09-2016& 16-09-2016 | 4,9 | 3 | 2,4 |
| 10 | 3+3 | 21-09-2016& 23-09-2016 | Group Discussions/Analogy & Idioms | 21-09-2016& 23-09-2016 | 4,9 | 3 | 2,3 |
| 11 | 3+3 | 28-09-2016& 30-09-2016 | Group Discussions/ Analogy & Idioms | 28-09-2016& 30-09-2016 | 9 | 3,6 | 6 |
| 12 | 3+3 | 05-10-2016& 07-10-2016 | PPT/ one-word sustitutes | 05-10-2016& 07-10-2016 | 9 | 3,6 | 6 |
| 13 | 3+3 | 19-10-2016& 21-10-2016 | PPT/one-word sustitutes | 19-10-2016& 21-10-2016 | | | 6,7 |
| 14 | 3+3 | 26-10-2016& 28-10-2016 | PPT/ one-word sustitutes | 26-10-2016& 28-10-2016 | | | 6,7 |
| 15 | 3+3 | 02-11-2016& 04-11-2016 | Resume Writing/ Reading Comprehension | 02-11-2016& 04-11-2016 | 4,9 | 3 | 2,4 |
| 16 | 3+3 | 09-11-2016& 11-11-2016 | Mock Interviews/ Verbal reasoning | 09-11-2016& 11-11-2016 | 4,9 | 3 | 2,4 |
| 17 | 3+3 | 16-11-2016& 18-11-2016 | Mock Interviews/ Verbal reasoning | 16-11-2016& 18-11-2016 | 4,9 | 3 | 2,4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **18** | **3+3** | **23-11-2016& 25-11-2016** | **LAB internal exam** | **23-11-2016& 25-11-2016** | | | |

| | **Instructor** | **Course Coordinator** | **Module Coordinator** | **HOD** |
|---|---|---|---|---|
| **Name** | **Dr.B.Samrajya Lakshmi** | **Dr.B.Samrajya Lakshmi** | **Dr.B.Samrajya Lakshmi** | **Dr.A.Rami Reddy** |
| **Sign with Date** | | | | |

**LESSON PLAN**

**Course Code& Course Name:** T211-HEAT TRANSFER **SEM:** VI

**Programme:** B.Tech **Department: ME**

Section: A/S Staff Name: Dr.K.Appa Rao

| S.No | Tentative Date | Topics to be covered | Actual Date | Num. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| | | **UNIT-I**: | | | |
| 1 | 27/12/16 | **Introduction** | | 1 | DM1 |
| 2 | 30/12/16 | Basic Modes of heat transfer | | 1 | DM1 |
| 3 | 31/12/16 | Laws of Heat Transfer, thermal diffusivity, thermal cond. | | 1 | DM1 |
| 4 | 2/1/17 | Applications of heat Transfer & Steady ,Unsteady and Periodic Heat Transfer | | 1 | DM1 |
| 5 | 2/1/17 | Rate equations: conduction, convection and radiation | | 1 | DM1 |
| 6 | 3/1/17 | General Heat Conduction equation in Cartesian Coordinates | | 1 | DM1 |
| 7 | 4/1/17 | Heat diffusion equation, boundary and initial conditions | | 1 | DM1 |
| 8 | 6/1/17 | Problems on Composite Walls | | 1 | DM2 |
| | | **One dimensional steady state conduction** | | | |
| 9 | 7/1/17 | ID Steady state Heat flow through the plane wall with constant Thermal Conductivity without internal heat generation | | 1 | DM1 |
| 10 | 9/1/17 | ID Steady state Heat flow through the plane wall with constant Thermal Conductivity with internal heat generation | | 1 | DM1,DM6 |
| 11 | 10/1/17 | Problems on composite wall | | 1 | DM1 |
| 12 | 17/1/17 | General Heat Conduction equation in Cylindrical Coordinates | | 1 | DM1 |
| 13 | 20/1/17 | General Heat Conduction equation in Spherical Coordinates | | 1 | DM1 |
| 14 | 21/1/17 | **Tutorial -1** | | 1 | DM1 |
| 15 | 23/1/17 | Problems on plane wall with internal heat generation | | 1 | DM1 |
| 16 | 23/1/17 | Problems on Critical Radius of Insulation | | 1 | DM1 |
| | | **UNIT-II** | | | |
| 17 | 24/1/17 | Heat flow through the plane wall and cylinder with variable Thermal Conductivity | | 1 | DM1 |
| 18 | 27/1/17 | Uniform Internal Heat generation in slabs | | 1 | DM1 |
| 19 | 28/1/17 | Problems on cylinder with internal heat generation | | 1 | DM1 |
| 20 | 30/1/17 | **Tutorial -2** | | 1 | DM2 |
| 21 | 30/1/17 | Sphere with internal heat generation | | 1 | DM1 |
| 22 | 31/1/17 | critical thickness of insulation for cylinder | | 1 | DM1 |
| 23 | 1/2/17 | problems - | | 1 | DM1 |
| 24 | 1/2/17 | Temperature distribution equation for fins | | 1 | DM1,DM6 |
| 25 | 3/2/17 | Derivation of long fins | | 1 | DM1 |
| 26 | 4/2/17 | **Tutorial -3** | | 1 | DM2 |
| 27 | 6/2/17 | Derivation of short fins -problems | | 1 | DM1 |
| 28 | 7/2/17 | Fin efficiency and effectiveness | | 1 | DM1 |
| 29 | 10/2/17 | Problems on fins and effectiveness | | 1 | DM1 |
| 30 | 10/2/17 | Systems with negligible internal Resistance | | 1 | DM1 |
| 31 | 11/2/17 | Lumped Heat Analysis | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 32 | 13/2/17 | Problems on Lumped heat capacity analysis | | 1 | DM1,DM6 |
| 33 | 13/2/17 | Plane wall with finite surface and Internal Resistance using Heisler Charts | | 1 | DM1 |
| 34 | 14/2/17 | Heisler chart problems | | 1 | DM1 |
| 35 | 14/2/17 | **Tutorial -4** | | 1 | DM2 |
| 36 | 15/2/17 | **Revision of two units** | | 1 | DM1,DM6 |
| | | **UNIT III** | | | |
| | | **Assignments** | | | |
| 37 | 18/2/17 | Types of Convective Heat Transfer | | 1 | DM1 |
| 38 | 20/2/17 | Dimensional Analysis | | 1 | DM1 |
| 39 | 20/2/17 | Buckingham PI theorem applied to Forced Convection | | 1 | DM1 |
| 40 | 21/2/17 | Significance of Non Dimensional Numbers | | 1 | DM1,DM6 |
| 41 | 27/2/17 | Velocity and Thermal Boundary Layers | | 1 | DM1 |
| | | **Forced Convection** | | 1 | DM2 |
| 42 | 27/2/17 | External Flow –Laminar and Turbulent Flow over a Flat Plate | | 1 | DM1 |
| 43 | 28/2/17 | Internal Flow through circular pipe –Laminar and Turbulent Flows - | | 1 | DM1 |
| 44 | 3/3/17 | Entry Lengths and Fully developed Flows | | 1 | DM1 |
| 45 | 4/3/17 | Reynolds Colburn Analogy | | 1 | DM1 |
| 46 | 6/3/17 | **Tutorial -5** | | 1 | DM2 |
| | | **Natural Convection** | | 1 | DM1 |
| 47 | 7/3/17 | Development of Hydrodynamic and Thermal Boundary Layer along a vertical plate | | 1 | DM1 |
| 48 | 10/3/17 | Empirical Correlations for vertical plates | | 1 | DM1 |
| 49 | 11/3/17 | Empirical Correlations | | 1 | DM1 |
| 50 | 13/3/17 | Empirical Correlations for Horizontal plates | | 1 | DM1 |
| 51 | 14/3/17 | Empirical Correlations for Horizontal Cylinder | | 1 | DM1 |
| 52 | 16/3/17 | **Tutorial -6** | | 1 | DM2 |
| | | **UNIT IV** | | | |
| | | **Boiling and Condensation** | | 1 | DM1 |
| 53 | 18/3/17 | Boiling heat Transfer Phenomenon | | 1 | DM1,DM6 |
| 54 | 18/3/17 | Pool Boiling | | 1 | DM1,DM6 |
| 55 | 20/3/17 | Different regimes of boiling | | 1 | DM1,DM6 |
| 56 | 20/3/17 | Critical Heat Flux | | 1 | DM1 |
| 57 | 21/3/17 | Film wise and Drop wise Condensation | | 1 | DM1,DM6 |
| 58 | 22/3/17 | Laminar Film wise condensation on Vertical Plates | | 1 | DM1 |
| 59 | 23/3/17 | **Tutorial -7** | | 1 | DM2 |
| | | **Radiations** | | 1 | DM1 |
| 60 | 24/3/17 | Nature of Thermal Radiation | | 1 | DM1 |
| 61 | 25/3/17 | Emissive Power-Absorption, Reflection and Transmission | | 1 | DM1 |
| 62 | 27/3/17 | Definitions related to Radiation | | 1 | DM1 |
| 63 | 31/3/17 | Configuration factor. or Geometry Factor or View Factor or Shape Factor | | 1 | DM1,DM6 |
| 64 | 31/3/17 | Laws of Black Body Radiation | | 1 | DM1 |
| 65 | 2/4/17 | Radiation heat exchange between two parallel plates, | | 1 | DM1,DM6 |
| 66 | 3/4/17 | Radiation heat exchange between two black isothermal surfaces | | 1 | DM1,DM6 |

| | | | | | |
|---|---|---|---|---|---|
| 67 | 7/4/17 | Radiation heat exchange between non black infinite parallel plates | | 1 | DM1,DM6 |
| 68 | 10/4/17 | Radiation shielding | | 1 | DM1 |
| 69 | 11/4/17 | **Tutorial -9** | | 1 | DM2 |
| | | **UNIT-V** | | | |
| 70 | 17/4/17 | Classification of Heat Exchangers | | 1 | DM1,DM6 |
| 71 | 18/4/17 | LMTD method for parallel flow Heat Exchangers | | 1 | DM1 |
| 72 | 18/4/17 | LMTD method for counter flow heat exchangers | | 1 | DM1,DM6 |
| 73 | 19/4/17 | LMTD for use with multi pass and cross flow Heat Exchangers | | 1 | DM1,DM6 |
| 74 | 19/4/17 | LMTD Parallel flow problems. | | 1 | DM2 |
| 75 | 21/4/17 | LMTD Counter flow problems | | 1 | DM1 |
| 76 | 21/4/17 | Problems on NTU method | | 1 | DM1 |
| 77 | 24/4/17 | Problems on Effectiveness of Heat Exchangers | | 1 | DM1 |
| 78 | 25/4/17 | **Tutorial -10** | | 1 | DM2 |
| 79 | 28/4/17 | Revision of topics | | 1 | DM1 |
| 80 | 29/4/17 | Advanced heat transfer topics –Printed circuit boards, unsteady heat transfer in Nuclear fuel rods | | 1 | DM6 |
| | | | **Total** | 80 | |
| **Total number of classes required to complete the syllabus** | | | | | **68** |
| **Total number of classes available as per Schedule** | | | | | **80** |

**NOTE: DELIVERY METHODS**: **DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial, **DM3:** Lecture with a quiz, **DM4**: Assignment/Test, **DM5**: Demonstration (laboratory, field visit), **DM6:** Presentations/PPT

At the End of the course, students attained the **Course Outcomes: CO1, CO2, CO3, CO4, CO5** & sample proofs are enclosed in Course file.

| **Signature** | | | |
|---|---|---|---|
| | **Name of the Faculty** | **Name of Course Co-ordinator** | **HOD** |
| | Dr.K.Appa Rao | Dr.K.Appa Rao | Dr.K.Appa Rao |

**LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING**
**MYLAVARAM**

**LIST OF EXPERIMENTS**

**Department: Mechanical** **Lab: Heat Transfer**
**Course : VI SEM** **A.Y: 2016-17**

**I CYCLE:**

1. Determination of Thermal Conductivity of Insulating Powder (Asbestos).
2. Determination of Thermal Conductivity of Metal Bar (Brass).
3. Determination of Thermal Conductivity of given Liquids (Engine Oil).
4. (A) Test on Heat Pipe Apparatus.

   (B) Determination of Thermal Conductance of a Composite Wall.
5. Study of Transient Heat Conduction (Unsteady Heat Conduction).

**II CYCLE:**

1. Test on Stefan Boltzmann Apparatus.
2. Test on Pin-Fin Apparatus.
3. Determination of Convective Heat Transfer Co-efficient of air in Natural Convection.
4. Test on Emissivity Measurement Apparatus.
5. (A) Test on Tube in Tube Parallel Flow Heat Exchanger.
   (B) Test on Tube in Tube Counter Flow Heat Exchanger.

**Lab-Incharge**

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**

**MYLAVARAM-521230**

**DEPARTMENT OF MECHANICAL ENGINEERING**

**HEAT TRANSFER LABORATORY**

**Course: VI SEM (B-Section)** **A.Y: 2016-17**

**I Cycle Schedule: BATCH-A**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| | Demo | Demo | Demo | Demo | Demo | Demo |
| 11/01/2017 | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ |
| 18/01/2017 | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ |
| 25/01/2017 | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ |
| 01/02/2017 | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ |
| 15/02/2017 | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ |
| 15/02/2017 | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ |

**I Cycle Schedule: BATCH-B**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| 11/12/2017 | Demo | Demo | Demo | Demo | Demo | Demo |
| 07/01/2017 | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ |
| 21/01/2017 | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ |
| 28/01/2017 | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ |
| 04/02/2017 | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ |
| 11/02/2017 | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ |
| 11/02/2017 | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ |

**Lab-Incharge**

**II Cycle Schedule: BATCH-A**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| | Demo | Demo | Demo | Demo | Demo | Demo |
| 15/03/2017 | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ |
| 15/03/2017 | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ | $A_5$ |
| 22/03/2017 | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ | $A_4$ |
| 22/03/2017 | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ | $A_3$ |
| 19/04/2017 | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ | $A_2$ |
| 19/04/2017 | $A_2$ | $A_3$ | $A_4$ | $A_5$ | $A_6$ | $A_1$ |
| | | ***INTERNAL TEST*** | | | | |

**II Cycle Schedule: BATCH-B**

| Date / Exp | I | II | III | IV | V | VI |
|---|---|---|---|---|---|---|
| 18/03/2017 | Demo | Demo | Demo | Demo | Demo | Demo |
| 18/03/2017 | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ |
| 01/04/2017 | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ | $B_5$ |
| 01/04/2017 | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ | $B_4$ |
| 01/04/2017 | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ | $B_3$ |
| 08/04/2017 | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ | $B_2$ |
| 08/04/2017 | $B_2$ | $B_3$ | $B_4$ | $B_5$ | $B_6$ | $B_1$ |
| | | ***INTERNAL TEST*** | | | | |

**Lab-Incharge**

**LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**
**DEPARTMENT OF MECHANICAL ENGINEERING**
**LESSON PLAN**

**COURSE: MACHINE DESIGN-II(S292)** **Programme: UG**
**CLASS: B. Tech SEM: VI (Section – B)** **A.Y : 2016-17**
**Faculty Name : SIVA SANKARA BABU CH** **Branch: Mechanical Engineering**

| S No. | Tentative Date | Topics to be covered | Actual Date | No. of classes | Content Delivery Methods |
|---|---|---|---|---|---|
| **UNIT-I:SLIDING AND ROLLING CONTACT BEARING** | | | | | |
| 1 | 28-12-2016 | Course educational objectives and outcomes | | 1 | DM1, DM6 |
| 2 | 29-12-2016 | Introduction to machine design, Objectives, their applications and various machine elements | | 1 | DM1, DM6 |
| 3 | 30-12-2016 | Viscosity and lubrication, bearing characteristic number,Sommerfield number- | | 1 | DM1, DM6 |
| 4 | 31-12-2016 | Types of bearings & Full, partial and fitted journal bearing | | 1 | DM1, DM6 |
| 5 | 02-01-2017 | Bearing modulus, bearing materials, factors, | | 1 | DM1, DM6 |
| 6 | 04-01-2017 | Design of journal bearing | | 1 | DM1 |
| 7 | 05-01-2017 | Mass of oil supplied - problems | | 1 | DM1 |
| 8 | 06-01-2017 | Heat generation and dissipation –problems | | 1 | DM1 |
| 9 | 07-01-2017 | Dimensionless parameters used in the bearing design – problem | | 1 | DM1 |
| 10 | 09-01-2017 | TUTORIAL-1 | | 1 | DM2 |
| 11 | 11-01-2017 | Rolling contact bearings, types and bearing life | | 1 | DM1 |
| 12 | 18-01-2017 | Materials used and designation of rolling bearings | | 1 | DM1, DM6 |
| 13 | 19-01-2017 | Static load and dynamic load capacity | | 1 | DM1 |
| 14 | 20-01-2017 | Selection of ball bearing - problems | | 1 | DM1 |
| 15 | 21-01-2017 | Selection of roller bearing - problems | | 1 | DM1 |
| 16 | 23-01-2017 | TUTORIAL-2 | | | DM2 |
| 17 | 25-01-2017 | Cubic mean load derivation - problems | | 1 | DM1 |
| 18 | 27-01-2017 | Reliability of bearings - problems | | 1 | DM1 |
| 19 | 28-01-2017 | Assignment -1/ Quiz-1 | | 1 | DM3, DM4 |
| **UNIT-II: ENGINE PARTS DESIGN** | | | | | |
| 20 | 30-01-2017 | **PISTON**: introduction to piston design, piston design | | 1 | DM1, DM6 |
| 21 | 01-02-2017 | Forces acting on the piston, construction design | | 1 | DM1 |
| 22 | 02-02-2017 | Properties of piston, Design of piston | | 1 | DM1 |
| 23 | 03-02-2017 | Piston design - problems | | 1 | DM1 |
| 24 | 04-02-2017 | Cylinder design, cylinder liners-design | | 1 | DM1 |
| 25 | 06-02-2017 | TUTORIAL-3 | | | DM2 |
| 26 | 08-02-2017 | **CONNECTING ROD**: Thrust in C.R, buckling load | | 1 | DM1 |
| 27 | 09-02-2017 | Stresses due to whipping action on connecting rod ends- problems | | 1 | DM1 |
| 28 | 10-02-2017 | **CRANK SHAFT:** Design of crank and crank shaft | | 1 | DM1 |
| 29 | 13-02-2017 | Strength of overhung shaft-problem | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 30 | 15-02-2017 | Strength of center crank shaft, crank pins-problem | | 1 | DM1 |
| 31 | 16-02-2017 | TUTORIAL-4 | | 1 | DM2 |
| 32 | 17-02-2017 | Assignment-2/Quiz-2 | | 1 | DM3, DM4 |
| 33 | 18-02-2017 | **Beyond Syllabus**: Flywheel design | | 1 | DM1 |
| | 20-02-2017 to 27-02-2017 | MID-I Examinations | | | |
| **UNIT-III: PULLEYS AND WIRE ROPES** | | | | | |
| 34 | 01-03-2017 | **PULLEYS:** Introduction | | 1 | DM1, DM6 |
| 35 | 02-03-2017 | Flat belt pulley , materials | | 1 | DM1, DM6 |
| 36 | 03-03-2017 | Design of pulleys for flat belt drive | | 1 | DM1 |
| 37 | 04-03-2017 | V-belts –designation and design | | 1 | DM1 |
| 38 | 06-03-2017 | Design of V- grooved pulley | | 1 | DM1 |
| 39 | 08-03-2017 | TUTORIAL-5 | | 1 | DM2 |
| 40 | 09-03-2017 | **WIRE ROPES: I**ntroduction**,** classification, designation | | 1 | DM1 |
| 41 | 10-03-2017 | Selection of wire ropes | | 1 | DM1 |
| 42 | 13-03-2017 | Stresses in hoisting ropes | | 1 | DM1 |
| 43 | 15-03-2017 | Design of wire ropes-problems | | 1 | DM1 |
| 44 | 16-03-2017 | TUTORIAL-6/ **Assignment-3/Quiz-3** | | 1 | DM2, DM3, DM4 |
| **UNIT-IV: MECHANICAL SPRINGS** | | | | | |
| 45 | 17-03-2017 | **SPRINGS:** Introduction, classification | | 1 | DM1, DM6 |
| 46 | 18-03-2017 | Stresses in springs and derivations | | 1 | DM1, DM6 |
| 47 | 20-03-2017 | Deflection and stiffness of springs | | 1 | DM1 |
| 48 | 22-03-2017 | Springs for fatigue loading | | 1 | DM1 |
| 49 | 23-03-2017 | TUTORIAL-**7** | | 1 | DM2 |
| 50 | 24-03-2017 | Spring failures, design of spring | | 1 | DM1 |
| 51 | 25-03-2017 | Natural frequency of helical spring | | 1 | DM1 |
| 52 | 27-03-2017 | Energy storage capacity in springs | | 1 | DM1 |
| 53 | 30-03-2017 | Tension and torsion springs | | 1 | DM1 |
| 54 | 31-03-2017 | TUTORIAL-8 | | 1 | DM2 |
| 55 | 01-04-2017 | Co-axial springs design- Problems | | 1 | DM1 |
| 56 | 03-04-2017 | Design of leaf springs- Problems | | 1 | DM1 |
| 57 | 06-04-2017 | **Assignment-4/Quiz-4** | | 1 | DM3, DM4 |
| **UNIT-V: SPUR & HELICAL GEARS, GEAR BOX** | | | | | |
| 58 | 07-04-2017 | **GEARS**: Introduction and terminology | | 1 | DM1, DM6 |
| 59 | 10-04-2017 | Types of gears, design formulae | | 1 | DM1, DM6 |
| 60 | 12-04-2017 | Design Analysis of gears, Estimation of centre distance, module& face width | | 1 | DM1 |
| 61 | 13-04-2017 | Design procedure of spur gears. | | 1 | DM1 |
| 62 | 15-04-2017 | Design of spur gears - problems. | | 1 | DM1 |
| 63 | 17-04-2017 | Design procedure of helical gears. | | 1 | DM1 |
| 64 | 19-04-2017 | TUTORIAL-9 | | 1 | DM2 |
| 65 | 20-04-2017 | Check for dynamic and wear considerations | | 1 | DM1 |
| 66 | 21-04-2017 | **GEAR BOX**: Functions, Progress ratio | | 1 | DM1 |
| 67 | 22-04-2017 | Speeddiagram, Kinematic arrangement | | 1 | DM1 |

| | | | | | |
|---|---|---|---|---|---|
| 68 | 24-04-2017 | Gear box design procedure -problems | | 1 | DM1 |
| 69 | 26-04-2017 | TUTORIAL-10/Assignment-5/Quiz-5 | | 1 | DM2, DM3, DM4 |
| 70 | 27-04-2017 | **Beyond the syllabus**: Design of Worm gear | | 1 | DM1 |
| 71 | 28-04-2017 | **Beyond the syllabus**: Design of Worm gear | | 1 | DM1 |
| | 29-04-2017 | REVISION | | 1 | DM1 |
| | 11-04-2016 TO 18-04-2016 | MID-II EXAMINATIONS | | | |
| | | | **Total** | 71 | |
| **Total number of classes available as per Schedule** (Including Tutorials-10; Assignment and Quiz -3; Beyond Syllabus :3) | | | | | **71** |
| **Total number of classes required to complete the syllabus** | | | | | **55** |

**NOTE: DELIVERY METHODS** :

**DM1**: Lecture interspersed with discussions/BB, **DM2:** Tutorial,
**DM3:** Lecture with a quiz, **DM4**: Assignment/Test,
**DM5**: Demonstration (laboratory, field visit), **DM6:** Presentations/PPT

**Course Educational Objectives:**The objectives of this course are

1. To understand the hydrodynamic lubrication in bearings
2. To understand the concepts related to journal bearings and rolling contact bearings
3. To understand the design considerations of the engine components.
4. To gain the knowledge on the principles and procedure for the design of power transmission elements
5. To understand the gears with respect to tooth bending strength and surface strength specifications and fatigue consideration

**Course Outcomes:**At the end of this course students will be able to

1. Design hydrodynamic journal bearings and evaluate the life of the antifriction bearings
2. Design the internal combustion engine components for safe and continuous operation
3. Select the wire ropes for elevators, cranes and hoisting machinery
4. Design the springs with respect to static and dynamic loads
5. Apply the design concepts to evaluate the strength of the gear

| | Course Instructor | Course coordinator | Module coordinator | Programme Coordinator | HOD |
|---|---|---|---|---|---|
| **Signature** | | | | | |
| **NAME** | **CH. SIVA SANKAR** | **K.V.VISWANDH** | **B. SUDHEER KUMAR** | **Dr. S. PICHI REDDY** | **Dr. K. APPARAO** |